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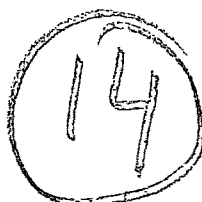
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Editorial

Editing a journal such as *Accounting and Business Research* demands academic, financial and technical skills. For all of these the past and present editors of the journal have had the benefit of much expert advice. In this issue a list is published for the first time of those academics on whose advice the present editor has mainly relied and hopes to continue to do so in their new guise as a Board of Editorial Referees.

Accounting and Business Research has not escaped the effects of the recession. We had hoped to be able to make 96 pages the normal length of each issue but are compelled to fall back to 80 pages for the moment: a reminder that academic objectives are necessarily constrained by what is financially and technically feasible!

We much prefer our contributors to be subscribers. What is worth publishing in is surely worth buying. For non-subscribers we must, we regret, charge a submission fee of £10 (US \$25).

In 1979/80 we published five issues instead of the usual four, so there were a more than usual number of articles competing for the Walter Taplin Prize awarded each year by *Accounting and Business Research*, the Association of University Teachers of Accounting (AUTA) and the Council of Departments of Accounting Studies (CODAS). We are pleased to announce that the prize has been awarded to Mr. C. A. Westwick for his article "The Lessons to be Learned from the Development of Inflation Accounting in the UK", published in our Autumn 1980 issue. This is an article of great interest to both academics and practitioners not only within the UK but also, it is hoped, in many other countries.

Auditor-Client Relationships and Their Impact on Bankers' Perceived Lending Decisions

Michael Firth

The importance of the auditing function is said to rest strongly upon the independence of auditors in carrying out their work. The professional accounting bodies have recognised the need for this and they have issued rules relating to the conduct of auditors which they hope will secure confidence in the auditing profession (ICAEW, 1975; ICAS, 1975).¹ The 1970s, however, have witnessed a growing volume of criticism of the work of auditors and of their independence (Firth, 1980a). In order to help restore public confidence in the auditing profession, the accounting bodies have recently revised their independence guidelines (ICAEW, 1977; ICAS, 1978).² The guidelines attempt to give the appearance of auditor independence by restricting auditor-client relationships which users of financial statements might deem to impair independence.³ In determining the detailed provisions of the independence guidelines, the professional bodies have made a subjective estimate of the optimum trade-off between the costs involved with the guidelines (e.g., a restriction of current fees) and the benefits of the guidelines (e.g., keeping confidence in the auditing profession and hence ensuring future fees).

Purpose of the paper

The purpose of the current paper is to present some empirical evidence on the importance of auditor independence. Specifically, a questionnaire approach is used where the perceived lending decisions of bank loan officers are studied.

The basic methodology involved sending a set of financial statements for a hypothetical company to a large sample of bankers. The financial statements had an unqualified audit report attached to them, but for some statements there existed a stated auditor-client relationship⁴ which may or may not be deemed by the responding banker to breach auditor independence. The audit reports of the remaining financial statements involved an independent auditor-client relationship. The bankers were asked to state 'what is the maximum amount of money you would be prepared to lend to the company?' The results were examined to see if there were any significant differences between the loan responses for companies with independent audit reports and those with (possibly) not independent audit reports. This will present us with some evidence on whether certain types of auditor-client relationship are deemed to impair or improve the loan prospect. The findings are compared against the official guidelines of the ICAEW/ICAS and this will indicate areas of concern that the professional accounting bodies might take another look at.

The research design differs from the 'importance score' methods used in earlier research in that it presents cases and asks for loan decisions. Thus the research design is a simplified version of the real life decision-making situations faced by bankers. Before describing the research design, a brief summary of prior research studies into the topic of auditor independence is made.

Prior research

There have been a number of recent studies which have investigated auditor independence and its impact on investment and lending confi-

¹Independence guidelines have also been set in the USA (see AICPA, 1972; Cohen Report, 1978; SEC, 1972).

²Since completing the research study, the ICAEW (1979) have further revised their independence guidelines; however, these do not differ greatly from the previous set of proposed guidelines (ICAEW, 1977; ICAS, 1978).

³Note, however, that no objective survey of the views of outside parties was undertaken.

⁴These were taken from the examples contained in the ICAEW (1977) and ICAS (1978) guidelines.

dence. These studies have postulated various auditor-client relationships and asked interested parties such as practising accountants, company accountants, financial analysts and bank loan officers, whether they thought independence might be impaired (Imhoff, 1978; Lavin, 1976, 1977; Lavin and Libby, 1977, in the USA, and Firth, 1980a in the UK). Some of the studies have gone further and asked the respondents to give an importance score (on a 1 to 5, or 1 to 9 scale) reflecting the extent to which a particular relationship may impair or improve the prospects of an investment or lending decision (Lavin, 1977; Lavin and Libby, 1977; Firth, 1980a). The results from these studies showed that:

- (a) The users of financial statements were more sceptical of auditor independence, for many of the relationships, than were the preparers of financial statements or the professional accounting bodies.
- (b) The mean importance scores for 'not independent' responses were significantly below the mean importance scores for 'independent' responses for all groups of respondents. Thus on average the impairment of auditor independence leads to a decrease in confidence of an investment or loan prospect. This finding is consistent with the traditional view of auditor independence.
- (c) Although the above gives the mean importance scores, there were a number of situations where at least one respondent thought a particular auditor-client relationship not only breached audit independence but actually improved the investment or loan prospect (Firth, 1980a). This shows that there is some evidence that, for some people at least, certain forms of relationship are beneficial to the investment or loan prospect. Given the well publicised and well entrenched traditional view of the importance of auditor independence it was interesting to find some respondents thinking that some auditor-client relationships actually improved the investment and loan prospects of a company.

Research design

Questionnaire Construction

The financial statements⁵ contained in the questionnaire comprise a profit and loss account, a balance sheet, and a sources and uses of funds

statement, for three years. An audit report and a summary of the 'Notes to the Accounts' were also set out. The financial statements were based on the actual financial statements of a medium sized, stock exchange listed, engineering company (the figures and the format of the statements were changed slightly so as to disguise this fact; knowledge of the name of the company could have affected the loan decision responses). Certain other information relating to the company's business was also given, i.e., stock market ratings and forecast earnings. The information contained in the financial statements showed that the firm had had a rising trend in earnings per share and that there appeared to be no indication of solvency or liquidity problems. We would have expected, therefore, that many bankers would be prepared to make a loan, of some amount, to the company (if there were an independent auditor relationship).

The information set contained in the questionnaire was based on prior experience with this type of study (Firth, 1980b) and from pretesting the questionnaire on a sample of ten bankers. The information set was modified after discussion with the bankers. The aim of the pretesting was to gain external validity for the task (to ensure that there was sufficient information for the subjects to make reasonable decisions) while not overburdening the subjects with redundant reading.

Attached to each audit report was a note setting out the relationship between the auditor and the client company. Nine specific relationships were utilised in the study and these are set out in Table 1. Eight of these specific auditor-client relationships had been examined previously (Firth, 1980a) and the results of this study are shown in Table 2. Column 2 of Table 2 lists the ICAEW/ICAS official views on these relationships and columns 3 and 4 list the AICPA and SEC rules. Column 5 relates to the perceptions of independence given by bankers in Firth's study.

Auditor-Client Relationships

Auditor-client relationship 1 represents an 'independent' stance; the auditor receives only a small percentage of his total fees from the client, has no personal relationships with the client, has no financial involvement with, or in the affairs of, the client, and has no conflicting interests. Such a relationship is deemed to be independent (ICAEW, 1977; ICAS, 1978; AICPA, 1972). The loan responses for companies with an auditor relationship as above provides the benchmark against which the other auditor-client situations are measured.

⁵A copy of these is available from the author.

Table 1
Auditor-Client Relationships Included in Questionnaire

1. An independent auditor-client relationship.
2. An accounting firm receives 15% of its gross fees from one client.
3. An audit partner has been in sole charge of a large audit (taking up 3 months of the partner's time) for the past ten years.
4. The recently appointed financial director of a company is responsible for producing its financial statements. He was previously a partner (for 10 years) in the accounting firm which does the audit.
5. A partner in charge of an audit owns 1000 shares in that client. There are 1 million shares in issue.
6. A partner in an accounting firm is the trustee of a trust which holds 10% of the issued share capital of an audit client of the firm. The partner does not personally take any part in the audit of the client.
7. A partner in an accounting firm managed a building owned by an audit client.
8. In addition to the audit, an accounting firm provided services for the client which included maintaining the journals and ledgers, making adjusting entries and preparing financial statements.
9. A professional accounting firm provides management consultancy services to a company which it also audits. The consultancy arm and the audit arm of the accounting firm are separate autonomous units.

Table 2
Official Views and Prior Research Findings on Auditor Independence

1	2	3	4	5
<i>Auditor-Client Relationship</i>	<i>ICAEW/ICAS</i>	<i>AICPA</i>	<i>SEC</i>	<i>FIRTH Percentage of Respondents saying 'Independent'</i>
1				
2	Independent			14
3	Independent*	Independent		79
4	Independent*	Independent		71
5	Not Independent	Not Independent	Not Independent	3
6	Independent	Not Independent	Not Independent	36
7	Not Independent*	Not Independent	Not Independent	13
8	Independent**	Independent	Not Independent	23
9	Independent	Independent	Not Independent	39

*This is the general position, although the Institutes state that the auditors must carefully consider the circumstances of each case.

⁺ *Note:* The professional accounting bodies have recently proposed that the situation depicted by Relationship 8 (relating to accountancy firms providing both accounting and audit services to a client) should be banned in the case of publicly quoted audit clients (see ICAEW, 1979). This contrasts with the earlier ICAEW statement (1977) which formed the basis of the tests described in the present study.

ICAEW position taken from ICAEW (1977)

ICAS position taken from ICAS (1978)

AICPA position taken from AICPA (1972)

SEC position taken from SEC (1972)

Firth position taken from Firth (1980a)

Relationships 2 to 9 were selected on the basis that:

- (1) they included a situation within each of the four areas of independence delineated by the ICAEW (1977) and ICAS (1978);
- (2) they included relationships where prior research (Firth, 1980a) had shown the ICAEW/ICAS views to be very different from the perceptions of bank loan officers, e.g. relationships 2, 6, 8 and 9;
- (3) they included relationships where the ICAEW/ICAS views are in contrast to those of major critics (e.g. Stamp's (1977) views on relationship 6) and those of official Government Reports in the USA (e.g. the Metcalf Committee's views on relationships 3, 4, 8, and 9 (US Senate, 1977));
- (4) they included a situation which on *a priori* grounds could actually lead to increased confidence in a loan prospect, e.g. relationship 5;
- (5) the wording of the situations had been pre-tested with the sample of ten bankers. Appropriate revisions were made in order to avoid ambiguities.

Relationship 2 gives a situation where the auditor receives a fairly large percentage of his fees from one client; however this is just within the independence bounds set by the ICAEW/ICAS ethical guidelines.

Relationships 3 and 4 have been commented on by the Metcalf Committee in the USA (US Senate, 1977) as areas of some concern. They recommended, for example, that 'as a minimum it seems prudent to rotate personnel assigned to a specific audit within an accounting firm'; this would prevent a situation such as relationship 3 occurring. Relationships 3 and 4 may also provide 'benefits' in that they could well lead to the audit being completed more quickly and thus audit fees may be reduced and company profitability increased. Additionally the audit may be undertaken with greater 'expertise' and valuable advice may be given to the company.

Relationship 5 was included because although it is widely regarded as impairing independence it could, for some people, lead to increased confidence in the loan prospect. Prior research has shown that some loan officers did regard auditors holding shares in client companies as improving loan prospects.

Relationship 6 was included as it is allowable under the ICAEW/ICAS ethical guidelines, although not in the USA, and because it has been severely criticised in the UK (Stamp, 1977). Ad-

ditionally, relationship 6 could possibly improve a loan prospect, as with relationship 5. Relationship 7 was included as it came under the heading of financial involvement with the client.

Relationships 8 and 9 were included as they are allowed by the ICAEW/ICAS ethical guidelines although they have been attacked from a number of sources. Additionally the Metcalf Committee (US Senate, 1977) has strongly recommended that both types of relationships should be banned. Whilst the relationships may result in better accounting records for the company and in better management advice being given, it does present the problem of the auditors auditing their own work.

Sample

The questionnaires were sent to a random sample of 1700 bankers who were members of the Institute of Bankers, the major professional society of bankers in the United Kingdom. Eight hundred of the sample received the financial statements which contained information on two auditor-client relationships, one of which was always relationship 1, that of an independent auditor. The other relationship was one from relationships 2 to 9 (in total, 100 of each relationship were sent out). The respondents were asked what was the maximum amount they would lend to the company, given auditor-client relationship 1, and the maximum amount they would lend, given the other auditor-client relationship. The means of the responses for relationships 2 through to 9 were then compared against relationship 1 to see if there were any significant differences; if there were differences then this would be solely attributable to the specific auditor-client relationship.

The advantage of giving two relationships to the subject is that it forces the respondent to explicitly consider the impact, if any, of the differences in the relationships. However, it may be argued that a respondent faced with the two relationships at once may give biased results, e.g. he may think he is required to give, or ought to give, different loan figures for the two relationships (when in fact it is perfectly all right to give two identical figures reflecting the fact that the respondent thought that the second relationship had no impact at all on the decision). In order to examine for this the remaining 900 respondents were sent financial statements with just one auditor-client relationship; that is each of the relationships 1 to 9 were sent to 100 respondents. The mean loan figures for each of the relationships 2 to 9 were compared against those for relationship 1.

Table 3
Sample Population and Response Rate

Questionnaire Containing Two Auditor-Client Relationships

Relationship 1 and Relationship	2	3	4	5	6	7	8	9
Questionnaires sent out	100	100	100	100	100	100	100	100
Questionnaire letter returned as not found	3	4	3	2	3	0	1	5
Response	71	80	74	70	69	76	72	74
Response rate %	73	83	76	71	71	76	73	78

Questionnaire Containing One Auditor-Client Relationship

Relationship	1	2	3	4	5	6	7	8	9
Questionnaires sent out	100	100	100	100	100	100	100	100	100
Questionnaire letter returned as not found	0	4	0	3	2	3	4	1	1
Response	80	74	81	70	74	70	68	72	77
Response rate %	80	77	81	72	76	72	71	73	78

Non-response Bias

In order to reduce the impact of non-response bias⁶ several steps were taken to ensure as high a response rate as possible. These steps included:

- (a) An advance letter was sent to the subjects, briefly explaining the purpose of the project and the benefits that could be derived from it. Various researchers have suggested that advance letters can result in a greater level of subject involvement and hence a higher response rate (Ford, 1967; Parsons and Medford, 1972) and that explanations of the research project and the expected benefits therefrom can similarly gain a better reception for the questionnaire (Dillman, 1972). The subjects were told that they could receive a summary of the research results, if they so wished.
- (b) A follow-up postcard was sent to the subjects seven days after the questionnaire was sent out (Nichols and Meyer, 1966). After 14 days a duplicate questionnaire was sent out. Previous studies have shown that such follow up techniques can lead to increased response rates (Williams and Wechsler, 1970).
- (c) The different communications (advance letter, covering letter for the questionnaire, follow up postcard and duplicate questionnaire) were all personalised (Dillman and Frey, 1974; Matteson, 1974).

The subjects who did not wish to complete the questionnaire were asked to return it blank and to state their reason for not completing. A total of 36 questionnaires were thus received. Questionnaires which were returned by the Post Office, or other, as having moved address, were omitted from the original sample of 1700 bankers in computing the response rate (Moser and Kalton, 1971).

The above procedures resulted in a total response rate of 74% and Table 3 summarises the figures.

In order to examine whether there was any significant non-response bias, a test suggested by Ferber (1948) and Oppenheim (1966) was used (see also Armstrong and Overton, 1977; Scott, 1961). This involved calculating the mean loan figure of the early repliers in a particular group and calculating the mean loan figure of the late repliers. The differences in the means between the early and late repliers were then tested for statistical significance; if significant differences are found then this suggests that there may be non-response bias. The tests showed that there were no statistically significant differences in the scores, for any of the groups, and hence the results indicate that there may be little non-response bias.

Biographical Detail

Certain biographical details were obtained from the respondents in order to see if background characteristics helped to explain the loan decision responses. The details collected were (1) age, (2) location of job, (3) academic and pro-

⁶See Kerlinger (1973) for a discussion of the effects of non-response bias on the validity of mail questionnaire surveys.

professional qualifications (all subjects had at least one professional qualification, that of being members of the Institute of Bankers), (4) number of years (if any) that the subject had worked for a professional accounting firm (bankers who have previously worked for an auditing firm may have different views regarding auditor-client relationships than do other bankers). The average age of the respondents came to 36 years; and 22% had jobs located in London and the Home Counties. Just over 7% of the respondents had a degree and/or professional qualification in addition to being members of the Institute of Bankers. Only 3% of the respondent bankers had any experience of working in a professional accounting firm.

Limitation of Research Design

There are a number of caveats to the research methodology and these should be borne in mind when interpreting the results. First the results relate to bankers' perceptions. This does not necessarily mean that they would be directly transferred into actions if such situations arose in real life.

Secondly there is the problem of external validity of the decision task. Although a pretesting stage was used, it may well be that some of the respondent bankers would normally have required more information before making decisions. Of the 36 subjects who returned a non-completed questionnaire, 14 of them stated that the case was too artificial and that further information would be needed. The case is artificial to the extent that bankers are not usually asked the question 'What is the maximum loan you would be prepared to grant?' (They are more usually asked for a specific loan and for a named reason, e.g. to purchase new plant and machinery. The bankers may well insist on receiving estimated cash budgets and pro-forma financial statements, incorporating the impact of the new plant and machinery, as additional information).

Thirdly the respondents will have had little or no prior experience of evaluating the importance of auditor-client relationships (as this sort of data has never been made public)⁷ and so their re-

sponses will be based purely on subjective judgment.

Despite the limitations of this research approach, there appear to be no other feasible methods of estimating the impact of the auditor-client relationships on bank lending decisions. Given the importance of the topic, some insights into the impact of auditor independence seem long overdue.

Results

The results of the study are shown in Table 4 (where respondents gave two loan figures, one relating to relationship 1 and the other to one of relationships 2 to 9) and Table 5 (where the respondents were faced with just one relationship). Row 2 of Table 4 shows the mean of the respondents' loan figures for relationship 1, for each group. Below that in row 3 appears the mean of the loan figures for each of relationships 2 to 9. The differences between the loan figures appearing in rows 2 and 3, for each group, were analysed for statistical significance using the standard *t* test. The significance level (0.05, 0.10, or not significant) is shown in row 4. Thus the difference between the loans granted for relationships 1 and 2 were significant (there is less than 5 chances in 100 that the difference could have occurred by chance). Rows 5 and 6 show the ranges of loan figures. Thus, of the 71 respondents in group 1, the lowest loan granted for relationship 1 was £1.5m and the highest was £15.8m. As can be seen, some respondents gave no loans.

In a few cases respondents gave lower loans for relationship 1 than for the other relationship. Row 7 gives the percentage of times, in each group, that a respondent gave a higher loan for the second relationship. Thus, in group 1-3, two respondents (i.e. 2% of 80) gave higher loans for relationship 3 than for relationship 1. This means that 2 out of 80 people thought that the 'dependent' relationship actually improved their confidence in the company. Presumably they thought the audit could be carried out with increased expertise because of the partner's long experience on the audit and that this outweighed the possibility of the partner being 'too close' to the company and its senior management to exercise unbiased judgment.

Table 4 shows that in seven cases, the auditor-client relationship was deemed to reduce bankers' confidence in the lending decision. The mean loans for relationships 2, 4, 5, 6, 7, 8 and 9 were significantly below those of the independent re-

⁷One exception is a survey published by the ICAS (1977) which revealed that chartered accountants in practice, including partners in major auditing firms, personally held shares in client companies. The survey also showed that many accountants held shares in client companies as trustees.

A large proportion of the recent Department of Trade investigations into company frauds and company bankruptcies have criticised auditing firms regarding standards and firmness in dealing with company chairmen of strong personality (see Davison, 1977). Some of these investigations have concluded that the auditors had not exercised independence in their work.

Table 4
Loan Responses where Respondents were Faced with Two Auditor-Client Relationships

	1-2	1-3	1-4	1-5	1-6	1-7	1-8	1-9
1. Auditor-Client Relationship Group								
2. Mean Loan (£m)	10.0	10.4	10.8	9.8	9.7	10.7	10.4	10.5
3. Mean Loan (£m)—Second Named Relationship	6.6	9.7	8.7	8.4	8.1	7.3	7.1	8.6
4. t-test	Significant 0.05	Not Significant	Significant 0.10	Significant 0.10	Significant 0.10	Significant 0.05	Significant 0.05	Significant 0.10
5. Range (£m)—Relationship 1	1.5 to 15.8	1.0 to 18.0	1.1 to 17.7	0.5 to 18.0	1.0 to 14.0	2.3 to 14.0	0.0 to 16.0	1.0 to 14.0
6. Range (£m)—Other Relationship	0.0 to 12.2	0.8 to 16.5	0.0 to 15.0	0.0 to 17.4	0.0 to 12.2	0.0 to 10.1	0.0 to 10.0	0.0 to 11.0
7. % of times the loan for the Second Relationship was above that for Relationship 1	0	2	2	10	0	0	0	2

Table 5.
Loan Responses where Respondents were Faced with One Auditor-Client Relationship

Auditor-Client Relationship	2	3	4	5	6	7	8	9
1. Mean Loan (£m)—Relationship 1	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8
2. Mean Loan (£m)—Other Relationship	7.0	9.5	8.5	8.6	8.6	8.5	7.3	8.3
3. t-test	Significant 0.05	Not Significant	Significant 0.10	Significant 0.10	Significant 0.10	Significant 0.10	Significant 0.05	Significant 0.10
4. Range (£m)—Relationship 1	2.0 to 14.0	2.0 to 14.0	2.0 to 14.0	2.0 to 14.0	2.0 to 14.0	2.0 to 14.0	2.0 to 14.0	2.0 to 14.0
5. Range (£m)—Other Relationship	0.0 to 12.5	0.0 to 13.0	1.0 to 12.0	0.0 to 13.0	1.0 to 12.5	0.0 to 11.0	0.5 to 10.0	0.0 to 10.5

relationship. The mean loan for relationship 3 was below that of relationship 1 but the difference was not statistically significant. Thus bankers' confidence was not significantly affected if the auditor had worked on the same audit for many years. The results also show that the range of the loan responses were similar, although the highest loan in each group always went to the independent relationship and the lowest went to the other relationship in each group.

Table 5 shows the results of the responses where the respondents were faced with just one loan decision. The responses for the auditor-client relationships 2 to 9 were compared against the loan responses of those faced with the independent relationship. The results were very similar to those of Table 4 with the mean loans for relationships 2, 4, 5, 6, 7, 8 and 9 being significantly different from the loans granted to the independent relationship.

The results can be compared against the official views of the British accounting bodies—which are shown in Table 2. For relationships 3, 5 and 7, the results agreed with the ICAEW/ICAS views. For the other five relationships (2, 4, 6, 8 and 9) the bankers' responses showed that their confidence had been significantly reduced, whilst the ICAEW/ICAS view was that independence had not been impaired. The above results suggest that some of the detailed provisions of the ICAEW/ICAS ethical guidelines contrast with the views and perceived decision making of practising bankers, who rely heavily on financial statements in reaching loan judgments. The results of the study were, however, consistent with an earlier study on perceptions of auditor independence in the UK (Firth, 1980a). This earlier study used a different approach and different sample subjects but the perceived attitudes relating to the eight auditor-client relationships were consistent with those shown in Tables 4 and 5.

A brief review of the results for each situation is given below:

(a) Relationship 2. In this case the bankers were concerned that the auditor's independence may be impaired; the auditor is dependent for a substantial proportion of his income from the client company and this may increase the chances of his giving (or being forced to give) a biased report.⁸ The evidence from here

and elsewhere (Firth, 1980a) suggests that the 15% criterion set by the ethical guidelines is too high; of course any reduction of this level (to say 5% or 10%) is likely to be met with stiff opposition by many small and medium size firms of practising accountants, as these are the ones likely to be most affected. In contrast, the large accounting firms may support such a move as they may actually gain clients from the other accounting firms who are forced to divest themselves of 'large-fee' clients (Britain has recently witnessed a number of companies changing to larger accounting firms for their audit requirements and this process is likely to be speeded up if tighter restrictions on fee income are imposed).

(b) Relationship 3. Here bankers and other interested parties (see Firth, 1980a) thought that there was no significant impairment of auditor independence. Clearly respondents thought that the possible increased expertise of the partner outweighed the possible bias due to his knowing the management personalities so well. The evidence here suggests that bankers and others in the UK do not currently share the concern of the Metcalf Committee (US Senate, 1977) regarding accounting personnel working on the same audit for many years.

(c) Relationship 4. In this situation bankers were concerned as to whether the auditor could remain completely unbiased in dealing with a former partner who now works for the client firm (similar results were found by Imhoff (1978) in the USA). The problems of strong personal relationships and the knowledge that the financial director has of the auditing firm's techniques, etc., could well lead to biased audits if the company and its financial directors wanted to take advantage of the situation (e.g. showing a more healthy financial position so as to obtain bank loans on more favourable terms). This finding echoes to some extent, the Metcalf Committee's view that accounting firms should not set out to place their staff with client companies (US Senate, 1977). Although the ICAEW/ICAS made no specific mention of this relationship in the ethical guidelines, their general guidelines do not preclude it. Whilst there are no statistics available, it seems quite likely that this type of relationship exists in Britain and some greater discussion of the possible problems it poses may be needed.

(d) Relationship 5. Here the bankers' mean response agreed with the official ethical guide-

⁸An additional factor is that if an audit is large in relation to the accounting firm, bankers may think that the accounting firm's expertise and resources will be unduly stretched.

lines and with the established views of most commentators. However, there was a wide degree of diversity in the responses and 10% of the respondents actually thought such a relationship improved the loan prospects of the company. These respondents presumably regarded the holding of shares in client companies by auditors as being an expression of confidence by the auditors (who have the benefit of inside information) and that this outweighed the possibility of bias by the auditor in his work.⁹ Future research could look at this aspect more closely and could incorporate the impact of different levels of investment by the auditor.

(e) Relationship 6. The responses of the bankers were in agreement with prior research (Firth, 1980a) and gave backing for the critics of the Institutes' guidelines relating to auditor independence and trustee shareholding (Stamp, 1977).

(f) Relationship 7. The responses of the bankers were in agreement with prior research and with the official ethical guidelines. Clearly the fact that the auditor also has a business interest with the client is enough to make bankers have doubts on the independence of auditors.

(g) Relationships 8 and 9. The responses suggest that bankers thought that these relationships could result in conflicts of interest and less confidence in lending money to the company. This finding supports the views of the Metcalf Committee in the USA but goes against the views of the official ethical guidelines. Restrictions on the supply of accounting services to client companies would affect the fee income of many small and medium sized accounting firms quite seriously, and restrictions on the provision of management consultancy services would affect the fee income¹⁰ and prestige of most large accounting firms. Thus imposing significant restrictions on these activities would probably be met by a lot of

opposition from within the accounting profession.

The results were also examined in relation to the biographical details of age, location of job, qualifications, and experience of having worked for a professional accounting firm. However, no significant associations were found between these variables and the loan decision responses.

Conclusions

The question of auditor independence has aroused a good deal of discussion recently and the research project set out to examine some aspects of independence. Specifically the study examined the perceived impact of eight auditor-client relationships, which might impair auditor independence, on bank lending decisions.

The results showed that seven of the relationships reduced bankers' perceived confidence in the company's financial statements and that significantly lower loan responses were given than if the company had had an independent audit. It was also found that five of these 'dependent' relationships were considered to be independent by the ethical guidelines of the major British professional accounting bodies. Clearly there is some discrepancy between the views of the ICAEW/ICAS on auditor independence and the perceived decision making of bankers.

Future research could take the form of examining other auditor-client relationships, conducting the studies after more exposure has been given to the possible 'benefits' of various types of relationship, examining whether the impact of auditor-client relationships are affected by the relative strength or weakness of the company's finances, and examining the views and decision making of other users of financial statements. Finally some research could also be conducted into how prevalent are the various auditor-client relationships discussed in this paper and elsewhere.

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⁹The above finding and explanation helps point out a possible future development of the auditing profession, that of providing investment advice. Although a discussion of this possibility is beyond the scope of the current paper, the holding/not-holding of client company shares could be one feature of such a development. In such a situation investors would want knowledge of the auditor's investment portfolio and the changes therein.

¹⁰Although the management consultancy services of many accounting firms are fully autonomous and organised as completely separate identities, they often share common partners and directors and have close relationships with one another.

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Bank Annual Report Disclosure Adequacy Internationally

Alfred Kahl and Ahmed Belkaoui

Several recent studies have investigated the disclosure adequacy of corporations in an American [2, 5, 17, 14] as well as in an international setting [3, 6]. With very few exceptions, all the results referred to the disclosure adequacy of the annual reports of non-financial corporations. The exceptions concerned the reporting practices of only two countries: the US [9, 18] and Canada [4]. The focus of this research is, therefore, on the disclosure adequacy of banks in an international setting. The study investigates the overall extent of disclosure by banks located in 18 countries. Disclosure adequacy is measured in this study by the extent to which 30 selected information items are presented in the annual reports.

Disclosure in an international setting

It is generally agreed that the most important means of communication with stockholders is the annual report. The extent of disclosure adequacy in the annual reports may be a major determinant of the quality of investment decision making in particular, and economic resource allocation in general.

Although the above arguments are applicable to all kinds of corporations, they have, thus far, received inadequate attention in the case of financial institutions since the thrust of public interest in the past has been the protection of depositors and/or clients rather than stockholders. It is generally agreed that the reporting practices of banks have not yet reached the same level of adequacy as the non-financial corporations.

Previous research indicates a marked difference in disclosure adequacy from one country to another. There are many reasons why this may be so. First, the dissemination of information by banks is heavily influenced by the particular reporting practices of a given country since the audience of interest of each country may be unique, or nearly so. Mueller and Walker [12] have suggested the following reasons: 'People

living and working in different cultures have different characteristics, attitudes, life styles and general behaviour patterns. These differences make for differing standards of comparison and possibly lead to different decision processes. Investment institutions differ from country to country, thus causing different information wants and usage. Accounting principles, as financial statement users understand them, are different from one country to another'.

Aware of these differences, the International Accounting Standards Committee recommends in one of its studies entitled 'International Financial Reporting' that multiple sets of statements, primary and secondary, be disclosed by firms seeking *multiple audiences of interest*. The primary statements are intended to satisfy the requirements of the local users while the secondary statements serve international users.

Second, the differences in bank reporting practices from one country to another may be due to their identification with one particular accounting tradition or model. Three basic accounting models have been alluded to in the international accounting literature. These models are the American, British and Continental, mainly France [8]. The assumption, as yet untested, is that the American model has expanded as a result of American direct foreign investment, while the others expanded because of the cultural impact on their former colonial empires [13].

Third, in some countries the ownership of bank stocks is spreading to the average investor, while in others the number of stockholders is kept to a minimum of 'firm hands'. The distribution of ownership among a wide group of stockholders may be motivated by the simple idea that the number of bank clients and depositors is positively related to the number of stockholders. It may, therefore, be inferred that the wider the distribution of shares in a given society, the higher the incentive to disclose more adequate information in the annual report.

Finally, the pressure for more adequate disclosure by banks may differ from one country to another. The more efficient the capital market, the more adequate the disclosure. For example, both McDonald [11] and Solnik [15] reported results to the effect that European capital markets are less efficient than those of the UK and the US. They also cited the looser requirements for disclosure in Europe as well as reporting practices as possible explanations of the European market inefficiencies.

However, in the US, the widespread ownership of bank stocks [9], the improving trends in the financial reporting practices of banks [9, 19], the voluntary disclosure predisposition [7] and the new stringent bank reporting requirements of the FASB and the AICPA [1, 10, 16] may create sufficient pressure for more adequate disclosure by large American banks.

We may, therefore, hypothesise that the US banks will be the leaders in disclosure adequacy, followed by those using the British model, then those using the Continental model.

With these considerations in mind, this paper reports on a study of the financial disclosure adequacy of banks internationally.

The sample

The seventy commercial banks selected for this study represent eighteen different countries. They are (number in parentheses shows the number of banks from that country in the sample): Australia (2), Austria (1), Brazil (1), Canada (10), Denmark (2), Finland (1), France (2), Germany (3), Holland (1), Italy (1), Japan (10), Norway (1), Singapore (1), Spain (1), Sweden (3), Switzerland (3), UK (11), and US (16).

The main criterion for the selection of a bank to be included in the sample was the general availability of an English language version of the annual report for the year 1975. Banks whose English reports were highly summarised were dropped from the sample. In spite of this restriction, the sample of 70 banks has the following advantages:

- (a) It represents the bank reporting practices of 18 countries of the non-communist world.
- (b) It includes one bank, Moscow Narodny, which is located in England but is Russian owned and operated.
- (c) It includes 20 of the 25 non-US banks with the largest direct foreign investment in the US [18]. The other five had to be deleted because

of the non-availability of English language annual reports.

(d) It includes banks which vary in size from \$172 million to \$66,763 million of total assets. This last dimension allows investigation of the possible association between the extent of disclosure and the asset size of banks.

Measurement of disclosure adequacy

A disclosure index composed of thirty items of information was used to evaluate disclosure adequacy. Despite the previously mentioned presumption that information needs, in general, may be different from country to country, we have developed a *single index* based upon the implicit assumption that the nature and importance of the accounting information needed about banks by investors is indeed constant throughout the world. The index was previously used for the study of Canadian banks [4]. A review of investment, financial and accounting literature was first conducted for the purpose of selecting a list of items most appropriate for bank annual reports. In addition, some other items were included on the basis of the authors' perceptions of information relevant for bank stock investors' decision making.

This procedure resulted in the final choice of thirty items of information to be used to construct a weighted disclosure index. In general, the items fall into two categories: items that may facilitate investment decision making by providing information more conveniently and those that may provide more insight into the quality of expected future earnings, thus reducing investor risk.

In order to assign weights to each item an appropriate procedure might be to ask financial analysts specialising in bank stocks to evaluate the importance of each item. This procedure was deemed impractical because of the difficulty of identifying, on an international basis, such analysts. Instead, fifteen business administration professors of the Faculty of Administration of the University of Ottawa, knowledgeable in international financial reporting, were asked to rank each item on a scale of zero to four, with higher scores indicating greater importance. The mean weights for all of the items are reported in Exhibit 1. In view of the possibility that the sample of professors might not be an adequate proxy for users of bank annual reports internationally, the same questionnaire was sent to all 50 of the bank financial analysts holding the professional designation CFA who were listed in the 1975 Directory

Exhibit 1. Disclosure Adequacy Index

<i>Rank</i>	<i>Item</i>	<i>Weights</i>
1	Indication of Market Value of Marketable Securities	3.47
2	Disclosure of Valuation Method, Market Value and Maturity of Investment	3.43
3	Comparative Statements	3.24
4	Disclosure of Accounting Policies	3.22
5	Disclosure of Income by Source	3.21
6	Basis of Consolidation	3.14
7	Supplementary Information in Table Format	3.13
8	Disclosure of Commitments, Contingencies, etc.	3.12
9	Disclosure of Fully Diluted Earnings Per Share	3.11
10	Accounting for Inflation	3.08
11	Information on this Year's Acquisitions	3.02
12	Disclosure of Deposits by Category	2.93
13	Disclosure of Foreign Assets and Liabilities	2.91
14	Disclosure of Method of Computing Current Provision for Loan Losses	2.84
15	Disclosure of Loans by Category of Borrower	2.83
16	Disclosure of Currency Translation Method	2.82
17	Accounting Treatment of Foreign Exchange Gains and Losses	2.81
18	Disclosure of Directors	2.75
19	Separation of Cash and Marketable Securities	2.74
20	Number of Shares in Each Class	2.73
21	Details of Leases	2.72
22	Bases of Valuation of Non-consolidated Investments	2.71
23	Disclosure of Pro Forma Earnings Per Share	2.70
24	Disclosure of Current Charge for Depreciation	2.63
25	Disclosure of Loan:Loss Ratio	2.61
26	Separate Disclosure of Depreciation of Bank Premises and Equipment	2.50
27	Basis of Computing Current Tax Provision	2.41
28	Disclosure of Accrued Income Receivable	2.33
29	Details of Pension Plans	2.22
30	Details of Corporate Charter	1.81

of the Financial Analysts Federation. Ten responses were received and their ranking of items was identical to that of the professors with some slight but not statistically significant differences in the weights. Hence, we conclude that the sample professors are, in fact, representative of bank annual report users. Obviously it would have been very difficult and time consuming to obtain similar information from bank stockholders, so this was not even attempted.

The findings

The 1975 annual reports of the 70 banks were evaluated on the basis of the response score assigned to each of the informational items in the disclosure index. Maximum, actual and relative disclosure scores were computed for each bank. The maximum score equals the sum of the response scores for all the applicable items of information for a given annual report. For example, if the descriptive section of the annual report does not discuss any acquisitions then the quantitative portion of the report could not be expected to disclose any information about current year ac-

quisitions. Similarly, objective definitions were used in other cases, such as for item 10 'accounting for inflation' which was interpreted to mean either of the following: general purchasing power restatement or current value financial statements. In the interest of conserving space, detailed explanation of all items has been omitted. The actual score equals the sum of the response scores for all the applicable items of information 'present' in the given annual report. The relative score expresses the amount of information present in the annual report or 'actual score' as a percentage of the maximum amount applicable or 'maximum score'. The relative score was used as a measure of the extent of financial disclosure by banks.

The results will be discussed in terms of (1) the international comparison of disclosure adequacy, (2) the association of disclosure adequacy with asset size, and (3) the relative importance of each information item.

First, the international differences in disclosure adequacy may be inferred from a comparison of the relative disclosure score of each of the banks in our study. Exhibit 2 presents a summary of the

Exhibit 2. Bank Financial Disclosure Rankings

Rank	Name of Bank	Country	Total Assets (in millions of US\$)	Fiscal Year-End	Disclosure Scores		
					Maximum (MS)	Actual (AS)	Relative (AS/MS)%
1	Manufacturers Hanover Corp.	USA	28,291	Dec. 31, 1975	81.3	76.8	94.46
2	First Commercial Bank Inc.	USA	1,593	Dec. 31, 1975	71.0	65.3	91.97
3	Chase Manhattan Corp.	USA	41,414	Dec. 31, 1975	84.4	76.9	91.11
4	Security Pacific Corp.	USA	14,874	Dec. 31, 1975	81.3	73.8	90.77
5	Bank America Corp.	USA	66,763	Dec. 31, 1975	81.3	70.8	87.08
6	Bankers Trust N.Y. Corp.	USA	20,611	Dec. 31, 1975	78.3	68.0	86.85
7	The Skandinaviska Enskilda Bank	Sweden	9,996	Dec. 31, 1975	76.8	66.5	86.59
8	Republic of Texas Corp.	USA	5,215	Dec. 31, 1975	84.4	71.7	84.95
9	Western Bancorporation	USA	18,713	Dec. 31, 1975	84.4	70.8	83.89
10	Citicorp	USA	57,850	Dec. 31, 1975	84.4	69.4	82.23
11	Bank of Scotland	UK	2,869	Feb. 29, 1976	78.6	63.3	80.53
12	Midland Bank	UK	20,973	Dec. 31, 1975	84.4	66.4	78.67
13	Marine Midland Bank, Inc.	USA	11,105	Dec. 31, 1975	84.4	63.5	75.24
14	National Westminster Bank Ltd.	UK	29,664	Dec. 31, 1975	84.4	62.9	74.53
15	Barclays Bank International Ltd.	UK	33,031	Sept. 30, 1975	84.4	62.6	74.17
16	Post-Och Kreditbanken (PK Banken)	Sweden	9,115	Dec. 31, 1975	74.7	55.2	73.90
17	Australia and New Zealand Banking Group Ltd.	Australia	9,340	Sept. 30, 1975	84.4	62.3	73.82
18	First National State Bancorporation	USA	2,203	Dec. 31, 1975	78.4	56.9	72.58
19	J. P. Morgan & Co. Inc.	USA	25,832	Dec. 31, 1975	84.4	60.9	72.16
20	Algemene Bank	Netherlands	17,855	Dec. 31, 1975	84.4	60.9	72.16
21	Götabanken	Sweden	2,856	Dec. 31, 1975	77.1	55.2	71.60
22	Union Bank of Finland Ltd.	Finland	2,743	Dec. 31, 1975	75.5	53.2	70.46
23	Dresdner Bank	Germany	28,285	Dec. 31, 1975	79.9	54.4	68.09
24	Industrial Bank of Japan	Japan	23,939	Mar. 31, 1976	74.1	49.4	66.67
25	European-American Bank & Trust Co.	USA	4,523	Dec. 31, 1975	82.6	54.6	66.10
26	Standard Chartered Bank Ltd.	UK	13,522	Mar. 31, 1976	84.4	54.1	64.10
27	Provinsbanken	Denmark	1,203	Dec. 31, 1975	78.2	49.6	63.43
28	The Hong Kong & Shanghai Banking Corp.	UK	1,148	Dec. 31, 1975	81.3	50.0	61.50
29	The Riggs National Bank of Washington	USA	1,534	Dec. 31, 1975	84.4	51.8	61.37
30	Irving Trust Co.	USA	11,107	Dec. 31, 1975	84.4	51.7	61.26
31	Hambros Ltd.	UK	3,038	Mar. 31, 1976	78.6	47.4	60.31
32	Andresens Bank AS.	Norway	1,924	Dec. 31, 1975	70.7	41.8	59.12
33	Commerzbank	Germany	21,555	Dec. 31, 1975	84.4	46.9	55.57
34	Banque Nationale de Paris	France	40,909	Dec. 31, 1975	84.4	46.5	55.09
35	Lloyds Bank Ltd.	UK	20,020	Dec. 31, 1975	84.4	45.6	54.03
36	United Overseas Bank Ltd.	Singapore	3,424	Dec. 31, 1975	84.4	45.5	53.91
37	Tokai Bank Ltd.	Japan	22,901	Mar. 31, 1976	71.0	37.1	52.25
38	The Mitsui Trust & Banking Co. Ltd.	Japan	5,112	Mar. 31, 1976	78.6	40.6	51.65
39	First Pennsylvania Corp.	USA	7,471	Jun. 30, 1975	78.5	40.5	51.59
40	Sumitomo Trust & Banking Co. Ltd.	Japan	30,782	Mar. 31, 1976	81.3	39.4	48.46
41	Swiss Credit Bank	Switzerland	14,039	Dec. 31, 1975	79.9	37.8	47.31
42	Toronto-Dominion Bank	Canada	13,577	Oct. 31, 1975	81.3	38.3	47.11
43	Royal Bank	Canada	25,211	Oct. 31, 1975	81.3	38.0	46.74
44	Union Bank of Switzerland	Switzerland	18,043	Dec. 31, 1975	81.3	36.7	45.14

Exhibit 2—(cont.)

Rank	Name of Bank	Country	Total Assets (in millions of US\$)	Fiscal Year-End	Disclosure Scores		
					Maximum (MS)	Actual (AS)	Relative (AS/MS)%
45	Bayerische Vereins Bank	Germany	18,597	Dec. 31, 1975	78.6	34.2	43.51
46	Bank of Nova Scotia	Canada	16,006	Oct. 31, 1975	81.3	35.3	43.42
47	Creditanstalt-Bankverein	Austria	2,043	Dec. 31, 1975	79.9	34.3	42.93
48	Mitsubishi Bank	Japan	30,163	Mar. 31, 1976	76.8	32.6	42.45
49	Swiss Volksbank	Switzerland	2,787	Dec. 31, 1975	76.8	32.2	41.93
50	Provincial Bank of Canada	Canada	3,059	Oct. 31, 1975	78.3	32.4	41.38
51	Bank of Montreal	Canada	18,243	Oct. 31, 1975	81.3	32.0	39.36
52	Canadian Imperial Bank of Commerce	Canada	22,259	Oct. 31, 1975	75.6	29.3	38.76
53	Banca Commerciale Italiana	Italy	21,780	Dec. 31, 1975	64.3	24.9	38.72
54	Copenhagen Handels Bank	Denmark	4,063	Dec. 31, 1975	84.4	32.3	38.27
55	Crédit Lyonnais	France	33,077	Dec. 31, 1975	79.9	29.4	36.80
56	Bank Canadian National	Canada	4,872	Oct. 31, 1975	78.7	26.8	34.05
57	Mitsui Bank	Japan	22,265	May 31, 1976	78.6	26.5	33.72
58	Mercantile Bank of Canada	Canada	1,288	Oct. 31, 1975	81.3	26.5	32.60
59	Dai-Ichi Kangyo Bank	Japan	36,406	Mar. 31, 1976	81.3	26.3	32.35
60	Unity Bank of Canada	Canada	172	Oct. 31, 1975	72.7	23.3	32.05
61	Maibl (Midland & Intl Banks Ltd.)	UK	1,323	Mar. 31, 1975	75.6	23.9	31.61
62	Banco Español de Credito	Spain	6,385	Dec. 31, 1975	72.8	23.0	31.59
63	Bank of British Columbia	Canada	625	Oct. 31, 1975	75.4	23.6	31.30
64	London Multinational Bank Ltd.	UK	662	Oct. 31, 1975	78.3	23.3	29.76
65	Banco do Brazil	Brazil	29,045	Dec. 31, 1975	84.4	22.4	26.54
66	Nippon Fudosan Bank	Japan	11,056	Mar. 31, 1975	84.4	21.1	25.00
67	The Bank of Adelaide	Australia	1,129	Sept. 30, 1975	78.6	17.3	22.01
68	Moscow Narodny Bank Ltd	UK	2,451	Oct. 31, 1975	81.3	17.1	21.03
69	Bank of Tokyo, Ltd.	Japan	30,511	Mar. 31, 1976	75.9	14.7	19.37
70	The Daiwa Bank Ltd.	Japan	17,095	Mar. 31, 1976	84.4	8.6	10.19

results of the computation of the relative disclosure score and ranking of each of the sample banks. The results indicate that the extent of disclosure is relatively different among the countries examined, with the US banks leading the list, as hypothesised. This superiority of US banks may be due to some items of information considered to be relevant in North America not being accorded the same treatment elsewhere. Nine of the top ten banks are located in the US. The seventh ranked bank is Swedish, as are the sixteenth and twenty first. The UK holds positions 11, 12, 14, 15, 26, 28, 31, 35.

However, if the data are grouped by country as in Exhibit 3, a slightly different picture emerges. The US remains in the top spot followed by Sweden, Holland, Finland and Norway in fifth position. The UK heads the second five, followed by Germany, Singapore, Denmark and Australia. France holds the eleventh position, followed by Switzerland, Austria, Italy, Canada, Japan, Spain and Brazil. Thus, on a composite basis, both Brazil and Spain disclose less than Japan. The reason

why Japan shows so poorly on an individual basis is probably due to the relatively large number of Japanese banks in the sample and the variability in their size. Although this country by country comparison is limited by the constraint that annual reports in English needed to be available in order for the bank to be included in the sample, in some countries there are only one or two dominant banks of international interest and these have been included. In Switzerland, for example, there are only three major banks. In most of the eight countries represented by only one bank, the major private bank is included. Despite this limitation, the country by country comparison is illustrative of relative disclosure practices in the different countries and necessary for the investigation of the three accounting models hypothesis.

The data do not seem to lend much credence to the three accounting models hypothesis since Scandinavian banks rank so highly, and little homogeneity is evident in the so called British sphere of influence. Likewise, there seems little

Exhibit 3. Bank Disclosure Adequacy by Country

Rank	Country	Number of Banks	Mean Asset Size (in millions of US\$)	Mean Disclosure Score
1	US	16	19944	78.35
2	Sweden	3	7322	77.36
3	Holland	1	17855	72.16
4	Finland	1	2743	70.46
5	Norway	1	1924	59.12
6	UK	11	11596	57.30
7	Germany	3	22812	55.72
8	Singapore	1	3424	53.91
9	Denmark	2	2633	50.85
10	Australia	2	5235	47.92
11	France	2	36993	45.95
12	Switzerland	3	11623	44.79
13	Austria	1	2043	42.93
14	Italy	1	21780	38.72
15	Canada	10	11044	38.68
16	Japan	10	23647	38.21
17	Spain	1	6385	31.59
18	Brazil	1	29045	26.54
		70		

Exhibit 4. Bank Disclosure Consensus Scores

Rank	Item	Consensus Score
<i>High Consensus</i>		
1	Disclosure of Directors	100.00
2	Separation of Cash and Marketable Securities	97.14
3	Disclosure of Income by Source	88.57
4	Supplementary Information in Table Format	87.14
5	Comparative Statements	84.29
6	Disclosure of Accounting Policies	75.71
7	Disclosure of Deposits by Category	71.01
8	Disclosure of Commitments, Contingencies, etc.	65.22
9	Basis of Consolidation	65.08
10	Disclosure of Current Change for Depreciation	62.86
<i>Moderate Consensus</i>		
11	Number of Shares in Each Class	59.42
12	Basis of Valuation of Non Consolidated Investments	59.32
13	Disclosure of Method of Computing Current Provision for Loan Losses	58.82
14	Disclosure of Valuation Method, Market Value and Maturity of Investments	58.57
15	Accounting Treatment of Foreign Exchange Gains and Losses	56.52
16	Information on this Year's Acquisitions	56.45
17	Separate Disclosure of Depreciation of Bank Premises and Equipment	54.29
18	Disclosure of Loans by Category of Borrower	50.00
19	Disclosure of Foreign Assets and Liabilities	49.23
20	Disclosure of Currency Translation Method	47.83
<i>Low Consensus</i>		
21	Disclosure of Pension Plans	45.71
22	Details of Leases	42.31
23	Basis of Computing Current Tax Provision	41.18
24	Disclosure of Diluted Earnings Per Share	38.71
25	Indication of Market Value of Marketable Securities	35.71
26	Disclosure of Accrued Income Receivable	25.71
27	Disclosure of Loan Loss Ratio	18.57
28	Accounting for Inflation	7.25
29	Details of Corporate Charter	1.79
30	Disclosure of Pro-forma Earnings Per Share	0

support for a continental disclosure model. However, over time, differences in European disclosure should decline due to the influence of the Common Market.

Second, the degree of association between the extent of disclosure and asset size was measured by calculating the Spearman's rank correlation coefficient between the relative score and the asset size rankings of each bank. Based on a correlation coefficient equal to 0.2 and a significant T test value equal to 1.68, the findings suggest that there is a relationship between size and adequacy of disclosure which is just barely significant at the 5% level (critical value of $t = 1.675$) but highly significant at the 10% level (critical value of $t = 1.298$).

Since previous research on non-financial firms has consistently found a positive correlation between size and extent of disclosure, we infer that the large proportion of non-North American banks in our sample is responsible for this result.

Third, the relative importance of each informational item is indicated in Exhibit 4 as a consensus score equal to the number of banks reporting the item divided by the number of banks for which a given information item was applicable. Exhibit 4 is divided in terms of the items showing high, moderate and low consensus. This classification establishes the priorities and the urgencies in the improvement of international financial reporting of banks. Of particular interest in the level of adequacy of financial reporting is the third category of low consensus items. It includes and identifies the major controversial items in need of a uniform international standardisation, mainly accounting for pension plans, accounting for long term leases, accounting for income taxes, accounting for earnings per share, accounting for marketable securities, accounting for accrued income receivable, accounting for loan losses, accounting for inflation, and financial forecasts. This list should be of prime interest to the International Accounting Standards Committee which is currently looking into a standardisation of financial reporting by banks internationally.

Conclusions

Conclusions can be drawn from this study. First, differences in disclosure adequacy exist internationally, at least for the countries included in our sample, with considerable variability in extent, and with US banks definitely the leaders. Second, the three accounting models hypothesis

which has been empirically supported for non-financial firms is not supported by our data on banks, thus suggesting that an alternative hypothesis must be formulated and tested. Third, the positive correlation between asset size and extent of disclosure was supported by the evidence in this study, although less strongly than might have been expected.

Finally, the information items used in this study to measure disclosure adequacy, when classified according to the consensus between producers and users of bank financial statements, indicate ten items of low consensus which are also subject to much current debate and controversy. These items obviously merit more research effort.

Financial managers in banks should focus their attention on these controversial items when formulating and/or revising their disclosure policy. Financial managers of non-financial firms might also consider these same points when taking disclosure policy decisions.

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Regulation and the Auditing Profession in the USA : The Metcalf Subcommittee's Recommendations Re-examined*

Frank Milne and Ron Weber

In December 1976, the US Senate Subcommittee on Reports, Accounting and Management chaired by Senator Lee Metcalf issued a report prepared by its staff entitled: 'The Accounting Establishment: A Staff Study'. In his covering letter to the Chairman of the Senate Government Operations Committee, Senator Metcalf argued:

The study was precipitated by continual revelations of previously unreported wrongdoing by major corporations, as well as a series of corporate failures and financial difficulties which have come to light in recent years. *In many cases, the problems which occurred were caused or aggravated by the use of accounting practices that failed to reflect accurately the substance of corporate business activities.*¹ (Our emphasis.)

On the basis of their study the staff of the Subcommittee recommended, *inter alia*, direct involvement by the Federal Government in establishing financial accounting standards and auditing standards, promulgating standards of conduct for auditors, and reviewing periodically the work performed by auditors.²

The report issued by the Subcommittee evoked strong criticisms. The American Institute of Certified Public Accountants issued a lengthy reply in which it argued there was 'a significant gap between the purported evidence and the

recommendations'.³ In its lead editorial, *Business Week* sharply criticised the report as being 'incompetently researched and grossly biased'.⁴ In November, 1977 the Subcommittee issued a second report titled: 'Improving the Accountability of Publicly Owned Corporations and Their Auditors'.⁵ The recommendations in the initial report were tempered and the Subcommittee encouraged private reform rather than mandatory reform as the preferred mode of action. However, it issued a warning of mandatory reform if progress was not timely.

In this paper we re-examine some of the major recommendations of the Subcommittee as they relate to the auditing profession. Our focus is the specific recommendations contained in the November, 1977 report; that is, the report of the Subcommittee itself and not the first report prepared by the staff of the Subcommittee. The framework we use for analysis derives from neo-classical economic theory.

Our motivations for undertaking the re-examination are fourfold. First, we are unaware of any other analyses that singularly have adopted an economic perspective; yet we believe this approach provides important insights into the

*We are indebted to members of the University of Queensland Department of Commerce research workshop for their comments. Sandy Wilson, John Eggleton, Glen Berryman, and a reviewer also provided comments on earlier versions of the paper. The usual disclaimer applies.

¹See 'Official Releases—The Accounting Establishment: A Staff Study,' *Journal of Accountancy*, March, 1977, p. 104.

²*Ibid.*, pp. 118–120.

³American Institute of Certified Public Accountants, *A Response by the American Institute of Certified Public Accountants to the study by the Staff of the Subcommittee on Reports, Accounting and Management, US Senate Committee on Governmental Affairs, entitled 'The Accounting Establishment,'* April, 1977, p. 6.

⁴'Sledgehammer Accounting,' *Business Week* January 31, 1977, p. 112.

⁵See 'Official Releases—Improving the Accountability of Publicly Owned Corporations and Their Auditors: Report of the Subcommittee on Reports, Accounting and Management of the Committee on Governmental Affairs United States Senate,' *Journal of Accountancy*, January, 1978, pp. 88–96.

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likely effects of government intervention in the auditing profession on the overall welfare of the society.⁶ Second, we fear the consequences of government intervention into the profession. Elsewhere, for example as with the medical profession, the consequences have in our view been disastrous and society has borne high costs. Third, the Subcommittee's recommendations may have profound effects on the types of services auditing firms can offer in the future. In 1978 the Public Oversight Board of the AICPA's SEC Practice Section held hearings on the scope of services that public accounting firms should provide. In light of the Metcalf Subcommittee's criticisms, a major concern was whether or not the provision of management advisory services by public accounting firms impaired their audit independence. Fourth, we are concerned about the ramifications of the Subcommittee's recommendations for moves towards regulation of the auditing profession elsewhere in the world. In Australia, for example, the New South Wales Attorney General announced his support for an Accounting Practitioner's Act to regulate and discipline the accounting profession, and an Accounting Standards Board that would endorse or reject accounting standards proposed by the accounting profession, company directors, stockbrokers, bankers, and other interested groups.⁷

The paper proceeds as follows. The first section briefly describes the framework we use for analysis of the Metcalf Subcommittee's recommendations. We provide detailed analyses of the recommendations in the second section. The third section discusses our views on the likely effects of regulating the auditing profession. Finally, we summarise the major conclusions of our paper and point out some research issues.

The framework for analysis

We hope that the extent of our bias in this paper is the acceptance of an analytical framework based on the efficient workings of a freely operating market. It is a well-known theorem in

economics that in the absence of public goods,⁸ externalities,⁹ or economies of scale,¹⁰ a perfectly competitive economy achieves a Pareto optimal allocation of resources; that is, the economy is in a state where no one can be made better off without making someone else worse off.¹¹

Adopting this framework for analysis, proponents of government intervention must justify their actions in terms of some kind of market failure. They can argue absence of the conditions for perfect competition; for example, lack of perfect information, slow adjustment of the market mechanism towards equilibrium, presence of barriers to entry. They can argue that externalities exist; that is, the market does not take into account the effects of one person's actions on another. They can argue that public goods exist; that is, producers and consumers of a good cannot use or consume it exclusively. They can argue that economies of scale exist; that is, increased output can be achieved at lower average cost.

However, market failure is only a necessary condition for justifiable government intervention. It still must be shown that even with market failure the welfare gains obtained through intervention exceed the costs of that intervention.

In the following section we examine some of the Metcalf Subcommittee's major recommendations on government intervention in the auditing profession and the arguments used to support that intervention. Our focus is on whether or not the Subcommittee has proven market failure exists in the market for auditing services. If market failure can be shown, the next question to be addressed is whether or not the benefits of government intervention exceed the costs.

Analysis of the Subcommittee's recommendations

Though the Subcommittee's report (the report prepared by the Subcommittee's staff) contains some specific recommendations on how government intervention could improve auditing and auditing standards, it is the second report (the

⁶An economic approach provides both theoretical and empirical insights. In this paper we focus on theoretical issues. However, once a regulation has been implemented its effects on the valuation of securities can be examined. For example, empirical research on the 1934 Securities Exchange Act was unable to show that the Act provided any additional information relevant to the valuation of securities. See George Foster, *Financial Statement Analysis* (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1978), pp. 546–548.

⁷'NSW Government Move on Standards,' *Australian Financial Review*, June 14, 1978, p. 28.

⁸A public good cannot be used or consumed exclusively, e.g., defence.

⁹An externality arises when the production or consumption of a good by one person has effects on another person who has no legal right to compensation, e.g., pollution.

¹⁰That is, increased output is associated with lower average costs.

¹¹See Peter Bohm, *Social Efficiency: A Concise Introduction to Welfare Economics* (London: The Macmillan Press Ltd., 1974). We have simplified matters here. Certain other conditions relating to non-satiety and preferences must be met.

report of the Subcommittee itself) that articulates in most detail the specific forms of the recommended interventions. The analyses in this section focus mainly on the second report.

An attempt to show that market failure exists usually requires some empirical evidence to support the arguments. For example, to argue that market failure exists because economies of scale lead to the formation of a natural monopoly requires a cost function to be estimated. Similarly, arguing that barriers to entry exist requires some empirical evidence to show the supply of a product has been constrained.

Unfortunately, in no case has the Subcommittee produced empirical evidence to support any of its arguments for government intervention. Instead the Subcommittee appeals to common sense, relies on casual empiricism, and invokes notions of ethics and equity. Neither do we attempt to refute the Subcommittee's arguments using empirical evidence. Our intention is to call into question the logic behind the Subcommittee's arguments. Ultimately the validity of our arguments and of the Subcommittee's arguments is an empirical issue, an area fruitful for further research. We simply wish to argue that there are too many doubts about the validity of the Subcommittee's arguments for them yet to form the basis for policy decisions.

Our specific analyses of the Subcommittee's recommendations follow. Note that we compare the likely outcomes of the Subcommittee's recommendations with the outcomes that would result in a freely operating market. Unfortunately, we are unable to evaluate whether social welfare gains or losses would result from the Subcommittee's recommendations if they were implemented in the current market for auditing services. The current market already is regulated;¹² thus, we would need to compare two regulated markets. Empirically this is a complex task; theoretically it may be impossible. However, comparing the Subcommittee's 'solution' with the free market 'solution' provides some important insights as to the likely effects of the interventions proposed.

An Organisation of Accounting Firms

As a first step towards instituting a programme of reform, the Subcommittee recommends establishing an organisation of accounting firms that serve as auditors of publicly owned corporations.

Membership of the organisation would be mandatory and the SEC would be responsible for overseeing its activities. The organisation would be responsible for establishing and enforcing minimum standards of auditor performance and behaviour.

In making this recommendation the Subcommittee seems to perceive two ways in which a freely operating market for auditing services will fail. First, they fear the consumers of auditing services will have imperfect information about the 'product' they purchase. As with all professions it is difficult for the 'average' man to evaluate the quality of the service provided. Second, the Subcommittee seems to argue that externalities arise in the production of auditing services. They contend that the *public* has expectations of the quality of services that auditors should provide. Unless auditors meet these expectations, the economic system will not function effectively. These two fears motivate most of the Subcommittee's recommendations for government intervention.

The notion that the consumers of auditing services must be protected is superficially appealing. Few consumers of auditing services could evaluate the product provided to them.¹³ However, we reject the argument that the consumer's inability personally to evaluate the service provided results in market failure. In a freely operating market for auditing services, consumers have at least four ways of evaluating the service provided or protecting themselves against the consequences of poor quality services. However, the consumers themselves must choose whether or not to evaluate the service or to obtain protection.

The first way in which consumers can obtain assurance as to the quality of auditing services provided is to purchase these services from an accounting firm that is a member of an organisation imposing standards upon its members and enforcing those standards. The existence of a freely operating market does not preclude the formation of professional organisations. Indeed, there is a positive incentive for such organisations to arise. Producers of auditing services incur information search costs trying to find an accounting firm that provides services having those characteristics that meet their needs. Professional organisations reduce these information provision

¹²Statute law in the USA requires public corporations to be audited.

¹³Presumably this reflects a rational decision on the part of consumers. The cost of their obtaining the necessary training, experience, information, etc. for evaluation purposes exceeds the benefits.

and search costs. Accounting firms that produce services having common characteristics share the costs of advertising. Consumers of auditing services share information search costs through the premium included in the audit fee for the producer to be a member of the professional organisation.¹⁴

The second way in which consumers of auditing services can protect themselves is to employ another accounting firm to evaluate the likelihood of the first accounting firm being able to provide auditing services having the characteristics they desire. As an analogy, consider the purchase of a second-hand car. The potential buyer can hire a qualified mechanic to examine the car and provide information relevant to the purchase decision. Many organisations in the market place specialise in offering this kind of service. Potential buyers make their decisions to purchase this sample information based on expected benefits and costs. In the market for professional services, professional 'ethics' often preclude this type of service being offered. However, in a freely operating market for auditing services, accounting firms would be hired to evaluate other accounting firms. Some accounting firms may even specialise in this evaluation function. Other accounting firms may have their services routinely evaluated, use this evaluation in their advertising to reduce information search costs for consumers, and entice more sales.

The third way in which consumers of auditing services can protect themselves is through the contract they sign with the accounting firm whose services they employ. In a freely operating market the contract could contain clauses relating to damages, non-performance, rights of redress, etc.¹⁵ The price of the auditing services purchased would simply reflect these contracted obligations. The consumer has to trade off price with the level of protection offered.

The fourth way in which consumers of auditing services can protect themselves is through taking out some form of insurance. Just as there currently exists an insurance product to cover most forms of risk, in a freely operating market a product would emerge to cover those risks associated with consumption of audit services.¹⁶

We see no reason for a single organisation of accounting firms where membership is mandatory. Such an organisation abrogates the consumer's right to trade off the quality of auditing services with the price charged. The only auditing services offered are those designated as acceptable by the organisation. Further, the history of such organisations is that they act as monopolists controlling not only the quantity and characteristics of output but also the price of the output. Inevitably the price is higher than that charged under competition and consumers incur welfare losses.¹⁷

We argue, also, that the overall quality of the auditing services offered by the member firms of such an organisation may decline rather than improve. We observe that single authoritative professional organisations often inhibit change and improvement.¹⁸ Consider, for example, the *débâcle* that occurred in countries such as Australia, the USA and the UK over whether or not to introduce price level change accounting. Clearly, some accounting firms believed price level change accounting to be 'better' than historic cost accounting. Though the current situation differs somewhat amongst the countries listed above, we argue that in effect accounting firms are inhibited or prevented from proceeding with a changeover. For example, in the USA, *APB Statement No. 3* encouraged companies to issue price level adjusted statements as supplementary statements and *FASB Statement No. 33* requires footnote disclosure of certain price level change and replacement cost data for large companies meeting specified criteria. Nevertheless, it is still not possible to replace historic cost statements with price level change statements as the primary financial statements. Thus, unconstrained choice of what data to disclose does not exist.

In a freely operating market, however, those firms favouring the change could have: (a) encouraged their clients to make the change, and (b) qualified the financial statements of auditees who did not report price level adjusted accounts. The market would have determined whether the change was better; that is, the benefits of making

¹⁴See, further, Milton Friedman, *Capitalism and Freedom* (Chicago: The University of Chicago Press, 1962), pp. 137-160.

¹⁵Naturally the courts must be able to enforce the contracts.

¹⁶Possibly there are some problems with this solution because of moral hazard issues. See, further, H. Demsetz, 'Information and Efficiency: Another Viewpoint,' *Journal of Law and Economics*, vol. 12, 1969, pp. 1-22.

¹⁷See, also, Friedman, *Capitalism and Freedom*, pp. 149-160, for a discussion on these matters with respect to the medical profession.

¹⁸In *ibid.*, pp. 153-160, Friedman argues that the powers of the American Medical Association have inhibited technological change. However, whether the quality level of the service produced by a monopolist (in this case, the AMA) will always be lower than the level existing under perfect competition is unclear. See Jack Hirschleifer, *Price Theory and Applications* (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1976), p. 316.

the change exceeded the costs. If the change was better, then those firms who first made the change would have obtained abnormal returns. If the change was worse they would have incurred losses.

In effect the auditing profession in the USA already has only a single professional organisation. Why would a government mandated organisation improve the welfare of the consumers any more than the existing private organisation?¹⁹ It may be that in a free market because of economies of scale only one organisation would emerge. However, we prefer to see the unconstrained interaction of producers and consumers determine the institutional form(s) that emerges.

We also have difficulty in seeing the types of externalities that allegedly arise from the production and consumption of auditing services and that motivate the Subcommittee to make such recommendations as mandatory membership of auditing firms in a single professional organisation. The onus is on the Subcommittee to show what economies or diseconomies arise that the market mechanism does not take into account. The Subcommittee makes some general statements about the public's declining confidence in the economic system.²⁰ However, we argue that this directly affects the market for auditing services. Declining confidence means lower demand for goods and services and perhaps as a consequence lower demand for auditing services. Alternatively, it might mean higher demand for 'private' auditing—people in the economy begin to trust each other less.

Mandatory External Quality Review

The Subcommittee recommends a programme of mandatory external quality reviews of auditing firms. These reviews will be undertaken every three years or when they are considered to be necessary. They will be conducted by 'broad-based teams appointed by the executive board of the accounting organisation'. This should be 'the first requirement' of the organisation of accounting firms. Again, the Subcommittee seems to believe that in a freely operating market for auditing services neither the characteristics nor the level of the services provided will be socially desirable.

We take issue with this recommendation on the basis of its underlying assumption; namely, that mandated pervasive auditing standards should exist. The Subcommittee's intention is to ensure that only a certain level of quality of auditing services is offered in the market place, again, presumably to protect the consumer and to prevent externalities occurring. However, the problem with mandated pervasive auditing standards is that they are too general: they can inhibit consumers' abilities to protect themselves rather than increase the level of protection.

Consider the case of a large organisation that maintains its financial records on a fourth generation computer. The systems are technologically complex: online realtime systems with communications facilities linking distributed databases, processors, and software. Much of the software has been written in-house to achieve efficient processing. External parties are concerned about fraud within the system. Has the integrity of the operating system been violated through the insertion of unauthorised code? It is unlikely that a 'broad-based' team, which should include 'members from outside the accounting organisation and some who are not accountants in order to reflect the broad public interest considerations embodied in the composition of the executive board', will be able to provide the assurance external parties need that the audit firm is capable of performing this sort of audit.

Alternatively, compliance with standards may mean that the quality of auditing service allowed to be offered is too high, and, as a consequence, too expensive for the consumer. For example, a creditor may attach only a small probability to a company failing. A cursory review of the company's financial records may be sufficient for the creditor's purposes. Further, if the records are maintained in a manual accounting system and the company is small, someone with only minimal accounting training may be capable of competently performing the audit. Mandated standards may mean that only a certified auditor can offer this service. The creditor may consider the audit fee charged by the certified auditor to be too high for the service and not purchase the service.

For comparative purposes we consider how standards evolve and are enforced in a freely operating market for auditing services. On the demand side both corporations and investors would purchase auditing services. Corporations would acquire auditing services to reduce agency costs; that is, the costs involved in ensuring that management acts in the shareholders' and bond-

¹⁹Again, we have difficulty in comparing the social welfare gains and losses brought about by one regulated market versus another regulated market.

²⁰It is difficult to know how a proposition such as this is testable. What does it mean? What does it imply?

holders' interests.²¹ Investors would acquire auditing services to determine whether or not noise exists in the signals disseminated by an organisation about its financial position. On the supply side, profit maximising audit firms would offer a range of audit services of varying quality and price.²² The market would clear when both producers and consumers of auditing services agreed on the characteristics of the service to be provided and the price for that service. In a freely operating market, then, a standard is the contractually defined characteristic of the service to be provided. Similarly, the means of enforcement are defined contractually through damages clauses, etc.

We do not preclude the formation of general standards or the use of external quality reviews in a freely operating market for auditing services. As we discussed earlier, a professional organisation may promulgate standards to reduce advertising costs and information search costs. Similarly, an audit firm may use an external quality review to advertise certain characteristics of the services it produces, thereby reducing the consumer's information search costs and hopefully stimulating demand for its product. Our main point is that the existence of standards and the use of external quality reviews should be market determined phenomena when entry into the market for auditing services is unconstrained.

Standard Setting

The Subcommittee recommends that the auditing and behaviour standards of the organisation of accounting firms should be established in open meetings where a broad range of interests is represented. The Subcommittee is especially concerned that the process of standard setting should not result in the creation of barriers to entry to the auditing profession. In their second report they note what they consider to be undesirable effects produced on smaller accounting firms through the establishment of certain standards by the Financial Accounting Standards Board. We have already argued that the producers and consumers of auditing services should be allowed to determine the characteristics of the services they offer and consume in the market place. Our con-

cern here is with the way the Subcommittee wants the standards of the organisation of accounting firms to be established.

In the absence of public goods or externalities, in a freely operating market only the producers and consumers of the goods reap the benefits and incur the costs of the exchange. Exchange takes place until the marginal utility derived from the exchange equals the marginal cost of the exchange, and in equilibrium a Pareto optimum exists. If the Subcommittee's recommendations are followed, parties external to the exchange will at least partially determine the characteristics of exchange in the market for auditing services. Those parties consider the exchange in terms of their cost/benefit functions,²³ but they are in no way constrained by the costs they would incur if they were involved directly in the exchange. Instead, the cost function they consider bears some relationship to their time involvement with the bureaucracy of setting auditing standards. In such an economy it is unlikely that an equilibrium will result that is Pareto optimal.

We do not see how the 'new' standard setting process recommended by the Subcommittee will prevent barriers to entry arising because of the nature of the standards established. The subcommittee perceives the problem with the current standard setting process to be the dominance of certain interest groups. Why would this disappear under the proposed arrangements? In any political process we expect to see lobbying by interest groups. The circumstances that allow certain groups currently to dominate the process in auditing still would exist under the new arrangements. If the Subcommittee wishes to remove barriers to entry to the market for auditing services, we suggest other measures; for example, removing state certification of public accountants, allowing the market to determine who should audit an organisation, and examining the set of so-called professional ethics to determine their effects on restraint of trade.

Corporate Audit Committees

The Subcommittee recommends that the SEC require publicly owned corporations to establish corporate audit committees. These audit committees 'should have sole authority to hire the independent auditor, set the audit fee, and dismiss the auditor'. The Subcommittee seems to feel that

²¹See Michael C. Jensen and William H. Meckling, 'Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure,' *Journal of Financial Economics*, October 1976, pp. 305-360.

²²Individual audit firms might still specialise in a particular type of service.

²³Or more esoterically their utility functions.

market failure exists in still another market; namely, the market for corporate audit committees.

We take issue with this recommendation on two bases. Our first concern is that public companies may be forced to undertake an activity where the costs exceed the benefits. By making audit committees mandatory, the Subcommittee would impose on producers and consumers of auditing services its own judgment on the costs and benefits of having an audit committee. The cost/benefit function of the Subcommittee and the cost/benefit functions of the producers and consumers of auditing services are unlikely to be the same. In a freely operating market for audit committees, if the benefits of audit committees exceed their costs, a profit maximising organisation would institute a corporate audit committee anyway.

Our second concern is that, again, parties not involved directly in the production and consumption of auditing services will at least partially determine the characteristics of exchange in the market place. Although shareholders make the ultimate decision, a corporate audit committee in effect is hired or fired by management. The success (profitability) of the members of the committee depends on how well they achieve management's objectives for the committee. However, in the current regulated market for auditing services, external parties in effect are forced to consume those services provided by the accounting firm hired by management. If corporate audit committees become mandatory, we predict that the behaviour of the members of these committees will be explained best by their ability to achieve what corporate management wants them to achieve and not by their motivations to maximise the welfare of all consumers of auditing services or the society in general.²⁴ Further, the producers of auditing services will attune themselves to the desires of corporate audit committees and not the end consumers of auditing services.

Disciplinary Criteria and Legal Liability

The Subcommittee makes two recommendations on penalties that should be applied to independent auditors who break professional standards or who are negligent. First, it argues that the professional organisation should publicly

discipline an offending auditor without waiting for the outcome of civil or criminal litigation. Second, it argues that auditors should not be able to limit legally their liability for negligent performance of duties.

The intention of the first recommendation is to increase the speed with which information about the quality of auditing services is disseminated in the market place. We do not argue against a professional organisation's right to take disciplinary action against its members. However, it is doubtful in terms of the Subcommittee's recommendations whether members will be able to take corresponding action against the organisation.

In a freely operating market where professional organisations exist, the success of an organisation depends in part on making correct decisions with respect to disciplining its members. Incorrect decisions result in countersuits for defamation, members leaving the organisation because they feel they are the victims or potential victims of unjust actions, and members leaving the organisation because they believe money is being wasted on unwarranted disciplinary actions.

If only one organisation exists where membership is mandatory, members can defend themselves only through countersuits for defamation. By changing its rules, the organisation can reduce the probability of success of a countersuit. Members are unable to leave the organisation if they are dissatisfied. Consequently, we argue that the amount of disciplinary action that would result is unlikely to be the same as the amount that results in a freely operating market, the latter being at a Pareto optimal level.

In terms of the Subcommittee's second recommendation, while we agree that there should not be a general limitation of liability for auditors, we find the alternative suggested by the Subcommittee to be equally unpalatable. If auditors are unable to limit their risk, one thing is sure: the price of auditing services will rise. Producers require a return for risk taking. The recommendation of the Subcommittee, if instituted, would increase the risk of accounting firms providing auditing services. To prevent an outflow of resources from auditing into other productive activities within the economy, the price of auditing services would have to rise to compensate producers for this increased risk.

Whether or not the consumers of auditing services want this increased protection is unknown. In a freely operating market for auditing services consumers would trade off protection against price. If consumers want high protection, they

²⁴Essentially this is the 'capture' theory of regulation. The regulated agent 'captures' the regulator and distorts its controls to its own advantage. See Richard A. Posner, 'Theories of Economic Regulation,' *Bell Journal of Economics and Management Science*, Autumn 1974, pp. 335-358.

would seek out accounting firms that are members of professional organisations where high standards exist and the standards are enforced. Further, the contract made between the producers and consumers of auditing services would limit the extent of the producer's legal liability based on the price paid by the consumer for the audit services.

Management Advisory Services

One of the Subcommittee's major recommendations is that the producers of auditing services be forbidden to provide management advisory services to their clients. The Subcommittee argues that provision of these services impairs the auditor's independence. The only management advisory services that should be provided are those directed at improving internal control within an organisation. We are uncertain why the Subcommittee believes a freely operating market for auditing services would not result in audit firms offering a level and quality of management advisory services and auditing services consistent with a Pareto optimum.

Audit firms offer management advisory services because they have a comparative advantage in this area. The knowledge audit firms acquire from undertaking an audit is also useful in providing management advisory services. Since this comparative advantage can be passed on to clients in the form of cost savings, there is an obvious incentive for clients to purchase management advisory services from their auditors instead of other management consulting organisations.

However, as the Subcommittee points out, there are costs involved in an organisation having its auditor provide management advisory services. The quality of the audit suffers through the auditor losing some independence. Since there are management consulting firms that provide the same management advisory services as accounting firms still surviving in the market place, the management of public corporations sometimes must decide presumably that the costs of lost independence exceed the benefits obtained from having their auditors provide management services. Otherwise, we would observe a continuing shift amongst the producers of management advisory services to become affiliated with accounting firms.

Further, we argue that the extent to which accounting firms currently provide management advisory services reflects a market equilibrium position. Admittedly, given the existing regulated form of the market for auditing services, the

demand for joint provision of auditing and management advisory services may be distorted. The current demand function primarily reflects management's utility functions. Unless the equity holders in an organisation are willing to expend considerable effort to get management to change the auditor or modify the services provided by the auditor, management makes the decision on how much joint provision of auditing and management advisory services will occur. In a freely operating market it is likely that equity holders could affect this decision more directly. Several auditors might examine the organisation: one appointed by management, another by shareholders, another by creditors, etc. Each consumer group would make its own decision on what type of services should be provided by the auditors it employs.

The effects of regulation: some predictions

What will be the effects of the government intervention proposed by the Subcommittee? The Subcommittee argues that intervention will improve the quality of auditing services provided by accounting firms through enhancing their professionalism and independence. In this section of the paper we argue a contrary viewpoint.

One of the Subcommittee's major criticisms of the accounting profession is its slowness to change and bring about reform. The Subcommittee intends the recommended interventions to be a means of facilitating change. However, we argue that intervention will *inhibit* change. In our view, also, the accounting profession has been slow to change in response to new environmental and task demands. However, we offer a different explanation from the one proposed by the Subcommittee as to why change has been slow. We argue that it is the legislation that exists already that has inhibited change; further legislation will inhibit change even more.

Consider, for example, the effects of state certification of accountants on the profession's ability to change. Certification ensures that prospective students are subject to a particular 'socialisation' process. This socialisation process instils in them common value sets and ways of thinking. Upon completing their training, new accountants then must comply with a code of ethics that governs their conduct. There is increasing recognition that some of those rules inhibit the free functioning of the market; for example, restrictions on advertising have been relaxed. Further, as we have argued before in the case of current cost accounting, the code of ethics can restrict the flow of new ideas into the market place.

Consider, also, how the current accounting standards setting process impairs the efficient flow of information between the producers and consumers of auditing services. The Securities and Exchange Commission ultimately has responsibility for establishing accounting standards for public corporations. However, it relies heavily on the standards promulgated by the Financial Accounting Standards Board. Both those bodies consist of individuals who are neither direct consumers nor direct producers of auditing services. Auditing services offered in the market place are not a result of face to face negotiation between producers and consumers. Instead, they are the result of a process where the cost/benefit functions of individuals who ultimately do not reap the benefits or incur the costs of the exchange play an important part.

The Subcommittee's recommendations introduce even more distortions into the market for auditing services. We predict that the profession will be even slower to change. If, indeed, the recommendations of the Subcommittee would bring about an improved state in the market for auditing services, that is, if the benefits of making the changes would exceed the costs, then mandatory reform is unnecessary anyway. Audit firms as profit maximisers would shift independently to this improved state. As the Subcommittee points out, audit firms actively seek out higher profits; there is intense competition in the market for auditing services. Any audit firm that did not shift to the improved state would be unable to survive in the long run.

Conclusions

In this paper we have examined the recommendations of the Metcalf Subcommittee within a neo-classical economic framework. To justify

government intervention into the market for auditing services, we have argued that the Subcommittee must show two things: (a) some form of market failure, and (b) given that market failure exists, that the benefits derived from intervention would exceed the costs.

We have attempted to identify the ways in which the Subcommittee seems to believe a freely operating market for auditing services will fail. Our conclusions are that the Subcommittee has not demonstrated convincingly that market failure exists, nor have they demonstrated convincingly that the forms of the intervention they recommend would result in an improved market for auditing services.

We do not argue that some form of market failure does not exist in the market for auditing services. All we claim is that it still must be demonstrated. Further research might examine this question. For example, is the nature of auditing services such that they are public goods? Do externalities result from the production and consumption of auditing services? Are the characteristics of the market for auditing services such that a natural monopoly will arise? Are information flows in the market for auditing services such that a natural monopoly will arise? Are information flows in the market for auditing services distorted and inefficient? Does the market for auditing services adjust quickly to an equilibrium position?

We have not examined all the recommendations of the Subcommittee relating to the market for auditing services; only those we believe to be the major ones. In some cases, from our free market viewpoint, we agree with the Subcommittee's recommendations: for example, those aimed at improving the efficiency of information flows in the market and those aimed at reducing barriers to entry. Interestingly, these recommendations would reduce rather than increase government intervention.

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Price Parity Translation: Methodology and Implementation

D. H. Patz

In a previous paper¹ an alternative theoretical basis for the translation (and consolidation) of foreign accounts was presented—a price parity theory of translation. At that time recognition was given to the fact that many questions had been left unanswered. Two issues in particular remain unaddressed, given that price parity translation can be accorded some potential theoretical merit and appeal, and both are basically (though not entirely) non-theoretical in nature. The first issue is exactly *how* the theory leads to an effective, logical and consistent translation methodology. The second issue is *how* implementation of such a methodology might be effected, and *why* such implementation should be seriously considered.

It is the purpose of the present paper to give some detailed consideration to these two issues—methodology and implementation. In the first section of the paper a reasonably parsimonious specification of price parity translation methodology is presented, with two seemingly important features added. First it is shown that the approach is not purely mechanical, at least in the relevant sense that the approach is tailored to the specific accounting problem faced and is not simply an indifferently applied mathematical exercise. At least one critic has expressed some apprehension about a perceived mechanistic quality inherent in price parity translation. Second, we explain unambiguously the economic nature of the translation 'differences' or 'adjustments' which arise in price parity translation-consolidation, something which defenders of conventional exchange rate methods have been especially hard put to do. We do not, however, present any detailed practical examples here due principally to space considerations, but would note that such

have been prepared and are available² to anyone interested (encompassing both historical cost and price level adjusted accounts).

In the second major section of the paper, consideration, albeit limited and non-empirical, is given to the question of obtaining/developing reasonably accurate measures of price parity. This of course is the major stumbling block in making price parity translation operational; and so the placing of this problem into theoretical and practical perspective occupies the remainder of the paper. As in the original theoretical paper, a US perspective is adopted, but once again the points made are felt to be generalisable.

Price parity methodology

Notation adopted

The following symbolic representations will be used throughout this section:

$a_{ijk}(x_{mk})$ = The measurement entered to balance sheet account i in the currency unit of country j at time k .

$r_{ijk}(x_{mk})$ = The measurement entered to revenue account i in the currency unit of country j at time k .

$e_{ijk}(x_{mk})$ = The measurement entered to expense account i in country j at time k .

$A_{ijk}(x_{mk})$ = The balance of account i in the currency unit of country j at time k ; i.e.,

$$\sum a_{ijk} = A_{ijk}.$$

$R_{ijk}(x_{mk})$
 $E_{ijk}(x_{mk})$ = as above $\sum r_{ijk} = R_{ijk}$,

¹D. H. Patz, 'A Price Parity Theory of Translation', *Accounting and Business Research*, VIII, No. 29 (Winter, 1977), pp. 14–24. See also D. H. Patz, 'The State of the Art in Translation Theory', *Journal of Business Finance and Accounting*, IV, No. 3 (Autumn, 1977).

²From the author, or in D. H. Patz, *A General Theory for the Translation and Consolidation of Foreign Accounts*, doctoral dissertation available from University Microfilms, Ann Arbor, Michigan.

$$\sum e_{ijk} = E_{ijk}.$$

(x_{mk}) = The dimensionality of the unit of measure where:

x = the property expressed by all currency units of measure; general command over goods and services.

m = location in the place dimension—the country to which the expression x refers. The place significance of the unit as an expression of command over goods and services.

k = location in the time dimension—the point in time to which the expression x refers. The time significance of the unit as an expression of command over goods and services.

I_{jk} = The price parity index for country j at point in time k ; the form assumed for the indices is $US = 1.000$, similar to exchange rates where there are n currencies and $n - 1$ exchange rates. $I_{2k} = 1_2(x_{2k}) / 1_{1k}(x_{1k})$, a ratio of the purchasing power of one foreign currency unit in the foreign country to the purchasing power of one dollar in the US.

$i = 1$ to n accounts.

$j = 1$ to N countries.

$m = 1$ to N countries.

$k = t - y$.

t = the current point in time = any large number (1000).

$y = 0$ to 1000 time periods.

a, r, e, A, R, E, I = numbers resulting from measurement or mathematical computation.

A Literal Metrics Solution

Illustration 1 presents a pure metrics view of the translation problem, where account balances are seen mathematically as exactly what they are. Mathematically, any account balance is simply the sum of individual measures taken over a period of time when the scale of measurement is different at each point in time for each country involved. The accounting measures differ by country with respect to the place dimension of the measuring units. Consistent with a purely math-

ematical and, therefore, totally neutral view, in Illustration 1 no specific accounting significance or meaning is recognised with respect to individual measures or sums of measures. As a result, the solution to the translation problem presented in the illustration merely involves consistent adjustment for the place dimension of the units by translating each individual measure at the price parity index that related the two currencies at the time of measurement. That is, each measurement is translated at the price parity index in effect at the date of the original transaction.

The solution illustrated is consistent with the general solution presented in the original theoretical paper. Each individual foreign accounting measure has been translated to an equivalent domestic magnitude of general purchasing power, and the place significance of each foreign measure has been preserved: $a_{ik}(x_{2k})$. The solution, however, can easily be seen as inadequate in an accounting context. The basic reason for the inadequacy is that the accounting unit of measure, unlike units of measure in the physical sciences, is not invariant over time. The solution in Illustration 1 is compatible with conversion of measures stated in invariant units. It ignores the possibility of variation in the size of either measurement unit, variation which does in fact occur because of price level change: $(x_{mt}) \neq (x_{mt-y})$. The result is that after-translation balances of monetary accounts will misstate the contemporary command over goods and services held. This obtains since measures of these money claims always possess current purchasing power significance and the use of historical price parity relationships is to restate current money claims in terms of the historical purchasing power they once bestowed.

For example, both domestic and foreign accounts receivable before translation reflected a present value of that asset as of the time of the balance sheet. In the parlance of the earlier paper, each reflected general purchasing power utility or general claim to goods and services in each economy at the balance sheet date: $A_{2it}(x_{it})$ and $A_{22t}(x_{2t})$. However, the foreign accounts receivable after translation no longer reflect the same current claim to goods and services unless the price parity index has remained constant over the period involved. In other words, numerically

$$\sum_k I_{2k} a_{22k}(x_{2k}) \neq I_{2t} A_{22t}(x_{2t}) \text{ since } (x_{2k}) \neq (x_{2t}).$$

However, it is (x_{2t}) that controls, since it is balances, not individual measurements, with which

Illustration 1**A Literal Metrics Solution**

<i>Balance Sheets</i>				
<i>Account</i>	<i>Domestic Balance</i>	<i>Foreign Balance</i>	<i>Translation</i>	<i>Translation Balances</i>
Cash/Receivables	$\sum_k a_{1,1,k}(x_{1,k})$	$\sum_k a_{1,2,k}(x_{2,k})$	$\sum_k I_{2,k} a_{1,2,k}(x_{2,k})$	$\sum_k a_{1,1,k}(x_{2,k})$
Inventories/Fixed Assets/ Deferred Charges	$\sum_k a_{2,1,k}(x_{1,k})$	$\sum_k a_{2,2,k}(x_{2,k})$	$\sum_k I_{2,k} a_{2,2,k}(x_{2,k})$	$\sum_k a_{2,1,k}(x_{2,k})$
Liabilities	$\sum_k a_{3,1,k}(x_{1,k})$	$\sum_k a_{3,2,k}(x_{2,k})$	$\sum_k I_{2,k} a_{3,2,k}(x_{2,k})$	$\sum_k a_{3,1,k}(x_{2,k})$
Deferred Credits	$\sum_k a_{4,1,k}(x_{1,k})$	$\sum_k a_{4,2,k}(x_{2,k})$	$\sum_k I_{2,k} a_{4,2,k}(x_{2,k})$	$\sum_k a_{4,1,k}(x_{2,k})$
Equity	$\sum_i \sum_k a_{i,1,k}(x_{1,k})$	$\sum_i \sum_k a_{i,2,k}(x_{2,k})$	$\sum_i \sum_k I_{2,k} a_{i,2,k}(x_{2,k})$	$\sum_i \sum_k a_{i,1,k}(x_{2,k})$
<i>Income Statements</i>				
Domestic Income =	$\sum_i \sum_k r_{i1,k}(x_{1,k}) - \sum_i \sum_k e_{i,1,k}(x_{1,k})$		$\sum_i \sum_k I_{2,k} r_{i2,k}(x_{2,k}) - \sum_i \sum_k I_{2,k} e_{i2,k}(x_{2,k})$	
Foreign Income =	$\sum_i \sum_k r_{i2,k}(x_{2,k}) - \sum_i \sum_k e_{i2,k}(x_{2,k})$		$\sum_i \sum_k r_{i,1,k}(x_{2,k}) - \sum_i \sum_k e_{i,1,k}(x_{2,k})$	

translation deals. Accounts receivable, being a monetary item, has current time significance as a balance. Monetary items, being money or claims to money, always express claim to goods and services of contemporary significance. The k subscript of a measure of a monetary asset or liability, regardless of when measurement was taken, will always possess the value of t . While the solution in Illustration 1 preserved the place significance of measures of monetary items, it resulted in a change in the time significance of the total of the measures. Thus, a purely neutral mathematical approach to translation will not suffice.

The Balance Sheet

Illustration 2 presents the results of taking a metrics view of the translation problem which is expanded to take into consideration the specific temporal characteristics of account balances when reported. First, the illustration gives recognition to the fact that monetary assets and liabilities possess significance as balances and that the significance is a current one. Thus, monetary items

are reflected in the illustration as $A_{ijt}(x_{mt})$ rather than simply as sums of measures:

$$\sum_k a_{ijk}(x_{mk}).$$

Second, by leaving non-monetary items as sums of measures, the illustration gives explicit recognition to the fact that such items do not possess unambiguous meaning as balances: $A_{ijt}(x_{mt})$.

It must be recognised that the unit of measure used and the particular accounting principles followed (GAAP) interact to give specific meaning to accounting measures. Adherence to historical cost does exactly this. A historically costed account has a specific meaning only as a series of historical economic sacrifices. To preserve historical cost and to preserve the meaning inherent in historical cost measurements it is necessary to preserve both the time and place significance of the individual measures. Indeed, it can be said that preservation of the information content of foreign-sourced accounting measures is equivalent to preservation of the numerical properties of those measures. The view of the balance sheet accounts in Illus-

Illustration 2**The Needed Solution**

<i>Balance Sheets</i>				
<i>Account</i>	<i>Domestic Balance</i>	<i>Foreign Balance</i>	<i>Translation</i>	<i>Translated Balances</i>
Cash/Receivables	$A_{11t}(x_{1t})$	$A_{12t}(x_{2t})$	$I_{2t}A_{12t}(x_{2t})$	$A_{11t}(x_{2t})$
Inventories/Fixed Assets/ Deferred Charges	$\sum_k a_{21k}(x_{1k})$	$\sum_k a_{22k}(x_{2k})$	$\sum_k I_{2k}a_{22k}(x_{2k})$	$\sum_k a_{21k}(x_{2k})$
Liabilities	$A_{31t}(x_{1t})$	$A_{32t}(x_{2t})$	$I_{2t}A_{32t}(x_{2t})$	$A_{31t}(x_{2t})$
Deferred Credits	$\sum_k a_{41k}(x_{1k})$	$\sum_k a_{42k}(x_{2k})$	$\sum_k I_{2k}a_{42k}(x_{2k})$	$\sum_k a_{41k}(x_{2k})$
Equity	$\sum_i \sum_k a_{i1k}(x_{1k}) + \sum_i A_{i1t}(x_{1t})$	$\sum_i \sum_k a_{i2k}(x_{2k}) + \sum_i A_{i2t}(x_{2t})$	$\sum_i \sum_k I_{2k}a_{i2k}(x_{2k}) + \sum_i I_{2t}A_{i2t}(x_{2t})$	$\sum_i \sum_k a_{i1k}(x_{2k}) + \sum_i A_{i1t}(x_{2t})$
<i>Income Statements</i>				
Domestic Income	$= \sum_i \sum_k r_{i1k}(x_{2k}) - \sum_i \sum_k e_{i2k}(x_{1k})$		$\sum_i \sum_k I_{2k}r_{i2k}(x_{2k}) - \sum_i \sum_k I_{2k}e_{i2k}(x_{2k})$	
Foreign Income	$= \sum_i \sum_j r_{i2k}(x_{2k}) - \sum_i \sum_k e_{i2k}(x_{2k})$		$\sum_i \sum_k r_{i1k}(x_{2k}) - \sum_i \sum_k e_{i1k}(x_{2k})$	

translation 2 allows this preservation to be fully accomplished by initially making the distinction that monetary account measurements before translation have numerical properties of (x_{mt}) while non-monetary accounting measurements have numerical properties of (x_{mt-y}) .

The view of the balance sheet adopted in the illustration is, conceptually, a modified abstraction of the view taken by Lorensen in *ARS No. 12* regarding the attributes of assets and liabilities and the temporal characteristics of asset and liability measurements. Indeed, Chapter 3 of *ARS No. 12* is equally applicable to the price parity index approach to translation. That chapter deals with the choice of appropriate exchange rates for the translation of important classes of assets and liabilities. The result is that Lorensen's work obviates the need to deal in detail with choice of appropriate price parity indices for translating the many different types of accounts which might be encountered in practice. His summary of rates to be used, current or non-current, in conjunction with applying *ARS No. 12* is equally valid for applying the price parity index approach.

Given specification of the temporal characteristics of the individual account balances, the translation solution presented in Illustration 2 follows directly from the general solution presented in the original paper. The time dimension of the measures in the balance sheet accounts, reflected in their k subscripts, indicates the appropriate time dimension for the price parity index to apply in order to effect translation. For those accounts stated in terms of the current time dimension (monetary), a current price parity index is appropriate (I_{2t}). Translated, the foreign monetary balances constitute dollar expressions of the current claim to goods and services in the foreign economy held by the foreign subsidiary. For those accounts which are accumulations of historical prices, each measure making up a balance is translated by applying the price parity index which related the foreign measure to domestic measures in the place dimension at the time of measurement (I_{2t-y}). The result is to express foreign costs in equivalent dollar magnitudes of economic sacrifice with respect to the foreign economy: $a_{i1t-y}(x_{2t-y})$.

The Income Statement

The solution in Illustration 2 to the income statement aspect of the translation problem remains consistent with respecting the temporal characteristics of accounting measures in restatement. Revenues and expenses are shown as sums of historical resource inflow and outflow measures. Their translation is shown accomplished by application of the price parity index in effect at the time each individual resource flow took place. Items which constitute amortisation of historically costed balance sheet accounts are translated at the indices in effect in prior periods when actual resource flows occurred, such as the dates of acquisition of the fixed assets to which depreciation relates. Similarly, revenues and expenses representing inflows and outflows of monetary resources are translated at the price parity index in effect at the time of the transactions (or accrual) during the current period. Clearly, use of weekly, monthly or yearly average indices for the latter type revenues and expenses would be a reasonable practical expedient.

The approach to income statement translation shown in Illustration 2 is comparable with what is done in traditional exchange rate methods. However, justification need not rest upon superficial and unconvincing arguments such as effecting translation as if the transactions had occurred in dollars (when in fact they had not). The approach taken simply rests upon the temporal characteristics of revenue and expense measures, clearly acknowledged as historical in the price level literature in particular, and upon the need to respect these historical characteristics in a restatement process. Only in this way can the foreign accounting measures be restated in dollars in a manner which makes them comparable and compatible with the domestic measures with which they will be combined. As the parent's income statement (unadjusted for price level change) reflects expressions of historical significance so also must any foreign income statement translated into dollars.

Translation Differences

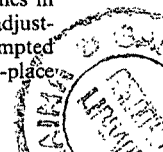
Noticeably absent from either the balance sheet or income statement representations in Illustration 2 is any indication of the presence of post translation-consolidation differences.³ Three types

of differences can occur, each significantly different by nature from the other. When price parity translation is applied to historical cost statements in consolidation, the following types of differences can arise:

1. *Relative* general purchasing power gains and losses from *holding* monetary resources abroad during inflation or deflation. Conceptually these items are comparable to the general price level gains and losses measured in price level accounting, except that in price level accounting the gain or loss measurement is in terms of absolute amounts of purchasing power gain or loss from holding monetary resources abroad during inflation or deflation *vis-à-vis* holding the resources domestically during US inflation or deflation. By nature, these gains and losses constitute the result of the price level aspect of the environment impacting on the consolidated entity. If the accounts are price level adjusted prior to translation and consolidation, the measures will be in terms of absolute amounts of consolidated purchasing power gained or lost, and so perhaps more subject to useful interpretation.
2. General purchasing power gains and losses resulting from the *transfer* of funds from one location to another. If funds are exchanged at an exchange rate which differs from price parity, a gain or loss in consolidated purchasing power results. By nature, these gains and losses constitute the result of the consolidated entity interacting with the exchange market aspect of the environment.
3. Translation adjustments resulting from the exchange of non-monetary historically costed assets between members of the consolidated group. In some respects these items are similar to the price level adjustments to historically costed assets which are part of that restatement process. Similar to 'the apparent increase in depreciation, when restated in terms of the cur-

³This is because of the difficulty in symbolically representing the translation differences, in particular the relative holding gain or loss and the translation adjustment. The relative purchasing power gain or loss cannot be specified as $a_{ih}(x_{2t})$, $a_{ih}(x_{1t})$ or $a_{ih}(x_{1t-y})$ and the closest symbolic representation

would seem $a_{ih}(x_q)$ where q is a matrix of two arbitrarily chosen values for m and two values for k . The choice of values for m can only be described as arbitrary as the concept of such a gain or loss is arbitrary in the choice of the alternative action upon which to base the gain or loss calculation. For example, if a gain arose from holding monetary assets in the foreign economy a loss arose from holding monetary assets in the domestic economy which is not being recognised. Also, any number of different size gains and losses arose from not holding the monetary assets in any number of other economies in which they could have been held. As to the translation adjustment, symbolic representation will not even be attempted beyond $a_{ih}(x_{2t}) \cdot a_{ih}(x_{3t-y})$, merely indicating the time-place-dimensional interaction which produces it.



rent dollar, is something of an optical illusion'⁴ are the translation adjustments in price parity translation. Where in price level accounting the 'write-up' of historically costed assets is the consequence of restating in terms of end of period dollars, the translation adjustment is the result of restating 'consolidated historical cost' in terms of dollars after a new configuration of consolidated assets has been effected through intercompany exchange. Just as in price level adjustment where adjustment can be to any point in time thus causing its size to vary, so transfer of non-monetary assets to any different point in the place dimension results in different translation adjustments.

The fact that, in dealing with historical cost statements unadjusted for price level, a *relative* purchasing power gain or loss will typically be measured raises an ancillary methodological point. The intent here has been to explain the nature of the translation differences that arise in price parity translation. However, should the elements of the total difference be separated and separately disclosed? In this researcher's opinion complete separation and emphasis on the translation gains and losses in reporting may in fact be dysfunctional. The usefulness of measures of relative purchasing power gain or loss is subject to question. Indeed, such measures may be downright misleading. For example, though inflation might be rampant in all countries in which a multinational firm is located, as long as it is less pronounced in the foreign countries a gain will be reported. For this reason it may be deemed desirable merely to combine the relative purchasing power gains and losses and translation adjustments into a single adjustment to consolidated equity, perhaps titled 'Adjustment to Restate Foreign Accounting Measures in Dollars of Equivalent Purchasing Power'. Indeed, it might be well to handle all translation differences in this fashion⁵ in historical cost accounts.

Implementation

The major stumbling block in making the price parity index approach operational is the acqui-

sition and/or development of reasonably accurate measures of price parity. The purpose of this section is to consider the question of acquisition or construction of acceptable sets of price parity indices for general use⁶ in translation and, in an overall sense, place the implementation question into perspective.

Obtaining Price Parity Indices

There already exists a considerable literature wherein price parity indices have been developed and this suggests one possible approach to obtaining reasonable indices of price parity. Already constructed indices may prove useful at the least in providing base relationships from which time series sets of indices can be calculated. There is also potential for using actual time series sets of indices that have already been developed or indices that are currently made available. In this regard, De Vries makes reference to the following sources of price parity index information:

The Federal Republic of Germany's Statistisches Bundesamt, in its *Statistisches Jahrbuch für die Bundesrepublik Deutschland*, regularly publishes, for example, estimates of purchasing power parities for about 15 countries. See also Milton Gilbert and Irving B. Kravis, *An International Comparison of National Products and the Purchasing Power of Currencies* (Organization for European Economic Cooperation, Paris, 1954); Milton Gilbert and Associates, *Comparative National Products and Price Levels* (Organization for European Economic Cooperation, Paris, 1958); and Economic Commission for Latin America (ECLA), 'A Measurement of Price Levels and Purchasing Power of Currencies in Latin America, 1960-62', *Economic Bulletin for Latin America*, Vol. VIII (1963), pp. 195-235.⁷

De Vries also indicates that price parity indices have been developed for Southeast Asia and Africa.⁸ There is a separate study on Indian price

⁴Accounting Research Study No. 6, 'Reporting the Financial Effects of Price-Level Changes' (New York: AICPA, 1963), p. 42.

⁵Such stockholder's equity treatment of purchasing power gains and losses is not without some support. See, for example, *Accounting Research Study No. 6, op. cit.*, pp. 149-152.

⁶The same sets of indices are expected to be used by all firms. The logistics of disseminating this information on a timely basis should not involve overwhelming problems. Monthly publication should be adequate.

⁷M. G. De Vries, 'Exchange Depreciation in Developing Countries', *IMF Staff Papers*, XV, No. 3 (November, 1968), Footnote 2, p. 561.

⁸*Ibid.*, p. 573. Her reference: Statement by Dr. M. Millikin in Hearings before the Subcommittee on Foreign Policy of the Joint Committee on the Economic Report, Congress of the United States (84th Congress, 1st Session, November 9-17, 1955, p. 23-29.

Table 1
Ratios of Purchasing Power to Exchange Rate for Selected Countries

Country	1950	1955	1965
United States	1.00	1.00	1.00
Germany	1.68	1.67	1.41
Canada	—	—	—
Denmark	1.64	1.48	1.25
Norway	1.74	1.46	1.38
United Kingdom	1.68	1.51	1.38
France	1.53	1.19	1.35
Belgium	1.35	1.32	1.36
Netherlands	1.70	1.72	1.40
USSR	—	—	1.16
Italy	1.87	1.84	1.52
Japan	—	—	1.86

Source: Appendix Table Z in P. A. David, 'Just How Misleading Are Official Exchange Rate Conversions?', *The Economic Journal*, LXXXII, No. 327 (September, 1972), p. 989.

parity indices.⁹ Table 1 makes it clear that purchasing power parity work has been done with respect to Russia and Japan. It is quite likely that additional studies are available and it is also likely that estimates of price parity have been developed by governmental agencies and other organisations such as the IMF, the United Nations and the World Bank.

Another possible approach to deriving price parity indices worth consideration is by way of systematically pricing a 'general market basket of goods' for all foreign economies for which indices are needed. There are prices for a limited number of commodities available from *International Financial Statistics* published quarterly by the IMF and in the *Monthly Bulletin of Statistics* published by the United Nations and data is also published by many governments for prices in their respective countries.¹⁰ Additional price information may again reside with major international organisations. This approach could provide fairly accurate and especially comparable base period indices which probably cannot be expected if diverse prior studies are drawn upon. Of course, this approach would require considerably more effort to implement.

A third approach which has particular appeal from the standpoint of simplicity is to attempt

identification of points in time for individual currencies where there is reason to believe that the exchange rate for a particular currency approximates price parity. Thus, base period relationships would be exchange rates based on the assumption that the particular exchange rates used were reasonable measures of the relative purchasing power of the currencies involved. This approach has already found some recognition in the accounting literature. Sapienza, for example, has espoused this 'constructed rate' approach for translation though he did not develop a theory to underlie the use of such rates and offered the approach only for managerial use and not for external reporting.¹¹ The NAA has also commented that:

In cases where there is a wide disparity between relative purchasing power of the United States and a foreign currency, significance of the dollar financial statements might be improved by using such indices for translation. Known statistical techniques and the basic data available for industrially important countries seem adequate to permit construction of indices sufficiently reliable for the purpose.¹²

Each of these three approaches to obtaining sets of price parity indices suitable for use in accounting holds promise for success. Quite possibly no one single approach will be totally satisfactory for all currencies since the circumstances surrounding different currencies vary. One approach which appears adequate and advisable for one currency may be totally inadequate or inadvisable for another. Where price parity time series already exist for some currencies, no further work may be necessary. In other currency cases, adequate market basket studies may have been performed and provide readily usable base period relationships which can then be adjusted for price level change. In still other cases exchange rates evidently approximating price parity may be apparent, or neither an existing study nor a usable exchange rate might exist and so intensive study of price relationships may be required.

Emphasis has been placed on obtaining base period relationships in the preceding discussion of possible approaches to obtaining price parity indices, since very frequent re-evaluation of the

⁹Population, Per Capita Production and Growth Rates', based on the 6th edition of the Atlas produced by the World Bank, *Finance and Development*, IX, No. 1 (March, 1972) p. 53.

¹⁰R. B. Klein, 'Inter-Country Purchasing Power Index Numbers', *Management Accounting*, LIV, No. 2 (August, 1972), p. 31.

¹¹S. R. Sapienza, 'Inflation and Foreign Investments', *Financial Executive*, XXXI, No. 4 (April, 1963).

¹²National Association of Accountants, *NAA Research Report No. 36*, 'Management Accounting Problems in Foreign Operations' (New York: NAA, 1950), p. 25.

absolute accuracy of the specific price parity indices in a series may not be practically feasible in many instances. Often the only reasonable approach may be a best effort attempt to specify a single price parity relationship at a point in time and to adjust that index backward and forward by general price level indices to obtain a complete time series. Only periodically, say every five or ten years, may it be practical extensively to re-evaluate the accuracy of the current index, in light of new information that has become available or through specific study of the situation at that time.

To illustrate, if, by whatever means, it is determined that the relative purchasing power of the German mark *vis-à-vis* the dollar at time t is 0.75 (i.e. 4 marks buy in general in Germany what 3 dollars buy in the US), then a complete price parity index series for the mark can be developed. Assuming that the general price level indices for both the US and Germany have been standardised to the base year ($t = 100$ in each index series), then calculation of the price parity index for Germany at $t - y$ would look something like this: $50/75 \times 0.75 = 0.50$, if the respective general price level indices for the US and Germany stood at 50 and 75 at $t - y$.¹³ If, at $t + n$, a periodic review of indices takes place, the same process is repeated and new series of base period $t + n$ are issued for general use.

Still, each of the foregoing approaches to obtaining price parity indices to serve as base period relationships is not without its problems. If existing studies or existing indices are used, then the problem of comparability between the methodology followed in constructing each index or set of indices arises. If the 'market basket' approach is followed then a whole series of problems typical of index construction must be faced; i.e. goods to be included, appropriate weighting schemes for these goods, comparability of the goods and so on. Data gathering could present some problems as well.

If the exchange rate approach to specify a base relationship is followed then the problem of locating a period in time for each currency where its exchange rate can be assumed to be a good estimate of price parity arises. Klein, for example,

asserts that 'no point in time meets this requirement'.¹⁴ He is probably correct in the sense that it is unreasonable to expect any exchange rate to be a perfectly accurate measure of relative purchasing power. Indeed, we recognise explicitly that purchasing power is only one of many variables which become impounded in exchange rates. However, surely some exchange rates are better estimates of price parity than others. For example, the period during 1971 when the dollar was floating has been described as:

an uncoordinated floating of currencies buttressed by controls on international banking flows, some trade restrictions, but on the whole a fairly responsible management of floating rates, meaning that authorities seek to maintain their rates at levels approximately reflecting underlying cost differentials and that they do not seek competitive advantages from manoeuvred rates.¹⁵

Keran remarks with regard to about the same period:

Since the emergence of the dollar standard in August 1971, most central banks have revealed a strong preference to control dollar balances through exchange rate changes rather than controls. In addition virtually all the exchange rate changes have been in the direction of eliminating under or overvalued currencies.¹⁶

In other words, perhaps a point in time near the August float period might provide a reasonable base period for many but not all currencies. The yen, for example, has repeatedly been cited as remaining undervalued at that time, and others are suspect with regard to overvaluation or undervaluation during that same period (e.g. the pound, the mark, the guilder). Another period for consideration might be at the time of Bretton Woods or shortly thereafter, under the assumption that purchasing power was given substantial consideration when initial rates were set.¹⁷

¹⁴Klein, p. 32 (see note 10).

¹⁵'The Practical Meaning of World Money', *Euromoney* (October, 1972), p. 46.

¹⁶M. W. Keran, 'An Appropriate International Currency—Gold, Dollars or SDRs?' *Federal Reserve Bank of St. Louis Monthly Review*, LIV, No. 8 (August, 1972), p. 13.

¹⁷For example, 1945 suggests itself both for a base period as well as a cut-off point for price parity index time series consistent with the AICPA price level study. 'The earliest point in time that seems to offer reasonable comparability of goods

¹³Data acquisition seems no problem; general price level indices for nearly all countries of the world appear quarterly in *International Financial Statistics*. 'Indexes which approximate changes in the general price level are now available for most countries', Accounting Principles Board, *Statement of the Accounting Principles Board No. 3, 'Financial Statements Restated for General Price-Level Changes'* (New York: AICPA, 1969), p. 13.

Clearly, however, if the exchange rate approach is chosen, considerable attention to the appropriateness of any particular base period exchange rate used will be required. Also, many different base periods should be experimented with and the resulting sets of indices compared.

The point remains, however, that each of the three approaches to constructing price parity indices involves some problems. Given the limited treatment here regarding development of price parity indices, undoubtedly some problems have been overlooked. Until substantive research aimed directly at constructing sets of price parity indices is performed, there is no way of telling for certain how serious the problems are.

Nonetheless, it is clear that the question of obtaining price parity indices is not whether they can be constructed but rather how accurate the indices will be as descriptions of reality. Following the exchange rate approach, for example, a monthly time series of price parity indices covering, say, thirty years could be constructed for the bulk of the countries of the world in a reasonably short time. The questions are how good such indices would be and whether they are worth the effort. The question of the practical feasibility of the price parity index approach is essentially one of costs versus benefits.

Costs Versus Benefits

There are at least two types of costs to be considered seriously regarding the price parity index methodology: the costs of obtaining price parity indices and the costs associated with any imprecision inherent in those obtained.¹⁸ The two types of costs are clearly related:

It requires little reflection to see that the aim of minimizing the effort to adjust data usually conflicts with the aim of precision. In effect, 'cost' of adjusting data rises as more precision is attained, just as the cost of the absence of precision goes up as one attempts to find 'simpler data.'¹⁹

and services is no earlier than 1945. If 1945 were selected as a cut-off date, all assets acquired and liabilities incurred prior to 1945 would be treated as if they had originated during that year. For most industries, the resulting inaccuracies would probably not be material.' *Accounting Research Study No. 6*, p. 112 (see note 4).

¹⁸Of course, there are costs associated with a changeover to any new method, including the cost of retraining accountants themselves. However, since price parity translation would disturb little of the day-to-day accounting and is fairly straightforward, such costs would be minimal.

¹⁹C. W. Churchman, *Prediction and Optimal Decision* (Englewood Cliffs: Prentice-Hall, 1961), p. 120.

The more care and effort expended in constructing price parity indices, the more precise they are likely to be as expressions of the relative purchasing power of currencies.

From a pragmatic standpoint, neither of the two types of costs is totally avoidable, because of both the need to keep the first type within reasonable bounds and the impossibility of obtaining perfect measures of purchasing power. 'Experience has shown that the concept of purchasing power is not only intricate but defies a unique solution'.²⁰ By the same token, these costs are 'new' costs in the sense that exchange rates neither require independent construction nor could they be labelled as imprecise as far as their specifying the market prices of currencies at points in time. Not requiring independent calculation, exchange rates are objective. On the other hand, some degree of subjectivity is bound to be involved in computing price parity indices regardless of the approach to construction followed.

Yet such limited reflection on the proposed approach does not allow a fair evaluation of its pragmatic feasibility or worth. There are additional considerations. The benefits to be derived from the price parity approach to translation must also be given explicit recognition to put the question of its operationality into proper perspective.

Error could creep into any series of price parity indices in two ways. The first source of error is the general price level indices used to adjust the base period price parity index. Foreign price level indices may not be comparable with the US index and any of the indices may be somewhat inaccurate. This situation, however, is little different from that faced in reporting foreign operations on a price level adjusted basis which is both in accordance with GAAP and at times actually the preferred mode of reporting.²¹ Nor is the problem much different from that faced by managers in using price level adjusted reports which contain the same sort of error. On the whole this error does not seem overwhelmingly serious.

²⁰R. Mattessich, *Accounting and Analytical Methods* (Homewood: Irwin, 1964), p. 46.

²¹Referring in particular to countries where the rate of inflation makes price level adjusted statements more meaningful, the APB states: 'The Board concludes that general price-level statements reported in the local currency of those countries are in that respect in conformity with accounting principles generally accepted in the United States, and that they preferably should be presented as the basic foreign currency financial statements of companies operating in these countries when the statements are intended for readers in the United States'. Accounting Principles Board, *Statement of the Accounting Principles Board No. 3*, pp. 12-13.

The second type of error arises through mis-specification of the base period relationship of relative purchasing power. This mis-specification will introduce an upward or downward bias in the translated accounting measures and so result in an overstatement or understatement of the utility held by the foreign company. This bias is systematic, however, and carries through the index time series as a constant.²² The systematic nature of the error tends to lower the amount of distortion introduced into the accounting statements. For example, because of error in the base period index, asset values would be overstated or understated but computations of increases and decreases would not be affected. Income would be overstated or understated but less dramatically so, as balance sheet amortisations enter into the computation of this figure. In other words, information on the dynamic aspects of the foreign firm is much less affected than information dealing with static aspects of the firm by any error in the constructed price parity indices. At the same time a basic benefit to be derived from the price parity index approach remains intact and must be considered as an offset to the costs of imprecision.

For the business man the *greatest* danger is in not recognizing the existence of inflation or in

not recognizing changes either upward or downward in *the rate of inflation*.²³

Inflationary effects come through unaffected by mis-specification in the base period and so awareness of the effects of this important environmental variable must be enhanced. Though this benefit cannot be stated in dollars and cents terms there is surely practical value in such information.

Finally, surely as well there must be pragmatic value of a dollars and cents nature in accounting information generated from a system based upon 'sound' theory. In this paper we have taken the theoretical merit of price parity translation as a given, and our limited purposes here make it inappropriate to take up this issue once again. Suffice it to say that certainly theoretical appeal and practical appeal are not totally separable, and clearly we are not alone²⁴ (historically and currently speaking) in questioning traditional approaches to translation on both of these grounds. Consequently, while not easily assessed *ex ante*, the potential benefits of price parity translation may be considerable indeed.

²²The bias is also proportionate across firms. This means that cross-sectional (across firms) valuation is unaffected by any upward or downward bias.

²³M. T. Wells, 'Devaluation and Inflation and Their Effect on Foreign Operations', *Accountancy* (August, 1965) as reprinted in K. B. Berg, G. G. Mueller and L. M. Walker, *Readings in International Accounting* (Boston: Houghton-Mifflin, 1969), pp. 271-272.

²⁴As a contemporary example, see G. M. Scott, *Eighty-Eight International Accounting Problems in Rank Order of Importance. A Delphi Evaluation* (AAA, 1980). The translation category of problems occupies the number one ranking.

Optimal Capital Structure Under the Imputation System*

J. Pointon

1. Introduction

The purpose of this paper is to investigate the effects of the imputation system on the optimal capital structure of the corporate enterprise. The valuation procedures derive from the Sharpe-Lintner-Mossin Asset Pricing Model¹ and so the conclusions are based, in particular, on a capital market which is perfect apart from taxation complexities, and which determines equilibrium prices according to mean and variance. We shall begin by observing the marginal rates of corporation tax relief on borrowing and the effects, if any, of Advance Corporation Tax Set-off, Stock Appreciation Relief and low levels of net taxable income, deriving from high levels of capital allowances. The taxation arithmetic for debt finance is contrasted with that of equity. Although the extension to a risky model differs from that of Modigliani and Miller,² not surprisingly the same results of the taxless but otherwise perfect world pertain. However, we develop an important extension to Modigliani and Miller's work under Corporation Tax³ by determining a solution where the interest on debt capital is not risk-free. Moreover, we incorporate a personal tax framework based on the UK system and analyse the

effects of dividend policy on optimal capital structure.

2. Marginal rates of tax relief

A summary of the tax advantages of debt versus equity finance is given in Table 1, assuming that the returns to shareholders are solely in the form of dividends and not capital gains. We see that the relative tax advantage of debt finance appears to be unaffected by the restricted set-off of Advance Corporation Tax, since the marginal tax rate on the interest relief is reduced to the same extent as that on the dividend. Nevertheless, the size of net taxable income is a critical factor. Since high levels of capital allowances may reduce the level of net taxable income to below the threshold of £100,000 or even £60,000, then capital expenditure decisions create interesting interactivities with respect to marginal tax rates for financing decisions.

Curiously, if bank interest is used to replace debenture interest then a higher tax relief is obtained provided the company is claiming relief on the appreciation of trading stock. Since the stock appreciation rules presently in force allow a deduction equal to the excess of the increase in stock value during the accounting period over a proportion (currently 15%) of trading profits for tax purposes after bank interest but before charges on income, then bank interest relief is effectively 15% higher than debenture interest relief. In this way if we compared the relative tax advantage of bank finance versus equity finance the figures in the final column of Table 1 would all be increased by 15% to 25.3%, 13.8% and 42.55%. However, the argument depends on there being a sufficient increase in stock values to trigger the relief; in most cases they will fluctuate so that from the company's point of view the special position of bank interest is uncertain and

*The author gratefully acknowledges the constructive comments of Prof. K. V. Peasnell.

¹Sharpe, W. F., 'Capital asset prices: a theory of market equilibrium under conditions of risk', *Journal of Finance*, vol 19, September 1964, pp. 425-442; Lintner, J., 'Security prices, risk and maximal gains from diversification', *Journal of Finance*, December 1965; Lintner, J., 'The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets', *Review of Economics and Statistics*, February 1965; and Mossin, J., 'Equilibrium in a capital asset market', *Econometrica*, October 1966.

²Modigliani, F. and Miller, M. H., 'The cost of capital, corporation finance and the theory of investment', *American Economic Review*, vol 48, 1958, pp. 261-97.

³Modigliani, F. and Miller, M. H., 'Corporate income taxes and the cost of capital: a correction', *American Economic Review*, vol 53, 1963, pp. 433-42.

Table 1

A summary of the tax advantages of debt versus equity finance under the Finance (No. 2) Act 1979

Net taxable income	ACT set-off	Marginal corporate tax relief on gross debenture interest	ACT set-off against corporation tax liability, as a fraction of gross dividends	Relative tax advantage of debt finance
		(i)	(ii)	(i)-(ii)
Over £100,000	not restricted	52%	30%	22%
Under £60,000 but positive	not restricted	42%	30%	12%
Between £60,000 and £100,000	not restricted	67%	30%	37%
Over £100,000	fully restricted	22%	Nil	22%
Under £60,000 but positive	fully restricted	12%	Nil	12%
Between £60,000 and £100,000	fully restricted	37%	Nil	37%
Nil or negative in all periods	fully restricted	Nil	Nil	Nil

possibly temporary. In the remainder of the analysis bank finance will be ignored.

The foregoing has implied that, *ceteris paribus*, £1 after tax in the hands of a debenture holder would be equivalent to £1 after tax in the hands of a shareholder; and that a £1 payment after tax for debenture interest would be equivalent, as far as the company is concerned, to a £1 payment after tax for dividends. Clearly, this ignores the way both investors and corporate managers view the risk attached to alternative forms of finance. Since debenture interest is paid in priority to dividends it is more certain and hence has a lower rate of interest required by the investor. The effect of financial risk on capital structure is developed in the next section within the framework of the Capital Asset Pricing Model (CAPM). However, the results of Section 4, concerning the conditions for tax neutrality, are consistent with those of King's model of optimal financial policy under the imputation system, although his analysis is based on a world of perfect certainty.⁴

3. The effect of taxes on CAPM valuations

The CAPM is based on the following assumptions:

- i all investors are maximisers of single-period expected utility of terminal wealth who choose among alternative portfolios on the

basis of mean and variance (or standard deviation) of returns;

- ii all investors can borrow or lend an unlimited amount at an exogenously given risk-free rate of interest, r_F , and there are no restrictions on short sales of any asset;
- iii all investors have identical subjective estimates of the means, variances and covariances of return among all assets, that is, investors have homogeneous expectations;
- iv all assets are perfectly divisible and perfectly liquid (that is, marketable at the going price), and there are no transactions costs;
- v there are no taxes;
- vi all investors are price takers;
- vii the quantities of all assets are given.⁵

Where the risk of a security, j , is priced according to its covariability with the 'efficient market', then the CAPM determines the equilibrium market value of the security as follows:

$$V_j = \frac{\bar{R}_j - \lambda \text{cov}(R_j, k_m)}{1 + r_F},$$

where

V_j = the equilibrium market value of security j ;

r_F = the risk-free interest rate;

⁴King, M. A., *Public Policy and the Corporation*, Chapman and Hall, chapter 4.

⁵This is a quotation from Weston, J. F. and Brigham, E. F., *Managerial Finance*, Holt Rinehart and Winston, 1978, pp. 431-432; see also Jensen, M. C., 'Capital markets: theory and evidence', *Bell Journal of Economics and Management Science*, 3, Autumn 1972.

R_j = the cash return (end of period wealth) to the holder of security j with mean \bar{R}_j ;

$\lambda = (\bar{k}_m - r_F)/\text{var}(k_m)$;

\bar{k}_m = the mean rate of return on the efficient market portfolio;

and

$\text{var}(k_m)$ = the variance of the rates of return on the efficient market portfolio.⁶

We shall now incorporate into the CAPM an imputation tax system such that, on payment of a dividend, the company is required to pay to the Inland Revenue a proportion b of the gross dividend as an advance payment of Corporation Tax (ACT) which we shall assume to be fully deductible in the calculation of the mainstream corporation tax charge. Shareholders pay a proportion h of the gross dividend as a higher rate tax on investment income, although they receive a tax credit at the basic income tax rate of b on the gross dividend, i.e., in effect, the ACT paid by the company is imputed to the shareholders. We shall assume that, out of funds available to shareholders, a net dividend payout at the rate of d is made. A full list of notation to be used is given in the Appendix.

By some fairly complex mathematical reasoning we can derive a relationship between the value of the levered firm and the value of the unlevered firm under the imputation system. This is shown in the appendix by equation (17) and is reproduced below:

$$\begin{aligned} V_L(1 + r_F) &= V_u(1 + r_F) + \sum_{i=1}^n p_i [1 - \lambda(k_{im} - \bar{k}_m)] \\ &\times \left\{ X_i(1 - h) + gD + gS_L - X_i(1 - T) \right. \\ &\times \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) - gS_u \left. \right\} \\ &+ \sum_{i=n+1}^N p_i [1 - \lambda(k_{im} - \bar{k}_m)] \left\{ Dk_d(1 - h) \right. \\ &+ (X_i - Dk_d)(1 - T) - g(X_i - Dk_d)(1 - T) \\ &+ gD + gS_L - X_i(1 - T) \\ &\times \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) - gS_u \left. \right\} \end{aligned}$$

$$\begin{aligned} &+ \sum_{i=N+1}^{\infty} p_i [1 - \lambda(k_{im} - \bar{k}_m)] \\ &\times \left\{ Dk_d(1 - h) + D + gS_L - (Dk_d(1 - T) + D) \right. \\ &\times \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) - gS_u \left. \right\} \quad (17) \end{aligned}$$

Equation (17) helps provide the vehicle for determination of optimal capital structure under the tax imputation system. The rationale of equation (17) may be explained as follows: the first term on the RHS of the equation demonstrates that before tax adjustments the value of an unlevered firm is the same as that of a levered firm in a perfect capital market. The second term represents the risk-adjusted value of the tax effects in those states of nature, $i = 1$ to n , where the net operating cash flow is insufficient to cover the contractual interest payments. With a levered firm in such states, debenture holders receive the net operating cash flow, X_i , on which they pay personal tax at the rate of h , together with a tax loss on the value of the debt D , at the capital gains tax rate of g ; and shareholders receive a tax loss worth gS_L . By contrast, for an unlevered firm the net operating cash flow, X_i , in such states is subject to corporation tax at the rate T . A proportion of this at the rate of d is paid in dividends and is grossed up by $1/(1 - b)$, for the imputed tax credit, but bears tax at the higher rate of h ; the remainder of $(1 - d)$ is a capital gain and taxed at the rate of g , with tax relief on the value of the shares S_u , also at the rate of g . The risk-adjustment is catered for by the expression $(-\lambda(k_{im} - \bar{k}_m))$.

The third term represents the risk-adjusted value of the tax effects in those states of nature, $i = n + 1$ to N , where the net operating cash flow is sufficient to cover the contractual interest payments but not enough to meet the full repayment of debt capital. Since the interest is paid in full, debtholders receive gross interest of Dk_d which is subject to personal tax at the rate of h . A partial repayment of debt capital is made on the net operating cash flow, X_i , after interest, Dk_d , and after tax at the rate of T . However, this repayment of capital is subject to capital gains tax at the rate of g although there is relief on the value of the debt, D . As far as shareholders are concerned, in those states of nature where there is insufficient to make the required payments to debtholders in full, returns to shareholders are nil, apart from the value of the tax loss gS_L . By contrast, for an unlevered firm the net

⁶Fama, E. F. and Miller, M. H., *The Theory of Finance*, Holt Rinehart and Winston, 1972, pp. 295-298.

operating income after corporation tax, $X_i(1 - T)$, is available for dividends at the rate of d on which personal tax is paid at the rate $h/(1 - b)$ as explained above, and for capital gains at the rate of $(1 - d)$ on which capital gains tax is paid at the rate of g with relief at the rate of g on the original value of the shares, S_u .

Finally, the fourth term shows the risk-adjusted value of the tax effects for those states of nature, $i = N + 1$ to ∞ , where obligations to debtholders are met in full. Debtholders therefore receive the contractual interest Dk_d on which income tax is paid at the higher rate h , and a capital repayment of D . The cash flow available to shareholders is given by $[(X_i - Dk_d)(1 - T) - D]$ being the net operating cash flow X_i , after interest Dk_d , after tax at the rate T , and after repayment of debt capital D . A proportion thereof is paid in dividends at the rate d and is worth after personal tax:

$$d \frac{(1 - h)}{(1 - b)} [(X_i - Dk_d)(1 - T) - D]$$

The remainder is a capital gain and worth after tax relief on the original value S_L :

$$(1 - d)(1 - g)[(X_i - Dk_d)(1 - T) - D] + gS_L$$

However, had the firm been unlevered, $D = 0$ and the returns in the form of dividends and capital gains after all taxes are:

$$d \frac{(1 - h)}{(1 - b)} [X_i(1 - T)]$$

and

$$(1 - d)(1 - g)[X_i(1 - T)] + gS_u \text{ respectively.}$$

Hence before the risk-adjustment the overall gain after tax to the shareholders of a levered firm *vis-à-vis* those of an unlevered firm is:

$$\begin{aligned} & d \frac{(1 - h)}{1 - b} [(X_i - Dk_d)(1 - T) - D] \\ & + (1 - d)(1 - g)[(X_i - Dk_d)(1 - T) - D] \\ & + gS_L - \left\{ d \frac{(1 - h)}{1 - b} X_i(1 - T) \right. \\ & \left. + (1 - d)(1 - g)X_i(1 - T) + gS_u \right\} \\ & = gS_L - [Dk_d(1 - T) + D] \left(d \frac{(1 - h)}{1 - b} \right. \\ & \left. + (1 - d)(1 - g) \right) - gS_u \end{aligned}$$

thus explaining the remainder of the fourth term in equation (17), noting that the X_i terms cancel out.

A special case of equation (17) is where personal taxation is ignored and the interest on debt is risk-free. By substituting the values $h = 0$, $b = 0$, $g = 0$, $d = 1$, $n = 0$ and $k_d = r_F$ we obtain:

$$V_L = V_u + \frac{T}{1 + r_F} \cdot r_F \cdot D \sum_{i=1}^{\infty} p_i [1 - \lambda(k_{im} - \bar{k}_m)]$$

But

$$\sum_{i=1}^{\infty} p_i k_{im} = \bar{k}_m,$$

hence

$$V_L = V_u + \frac{TD \cdot r_F}{1 + r_F}. \quad (18)$$

By amending our one period model into a multi-period one so that we capitalise the tax relief on the interest payments in future periods also:

$$\begin{aligned} V_L = V_u + TD r_F & \left(\frac{1}{1 + r_F} + \frac{1}{(1 + r_F)^2} \right. \\ & \left. + \frac{1}{(1 + r_F)^3} + \dots \right) \end{aligned}$$

supporting the Modigliani-Miller result³ that:

$$V_L = V_u + TD \quad (19)$$

However, not only is it impractical, for the UK situation in particular, to ignore income and capital gains taxes but also the assumption of a risk-free rate of interest on debt capital for high levels of leverage is unrealistic. Fortunately, equation (17) provides the medium for firm valuation in a market which is perfect apart from the tax environment, given of course the underlying assumptions of CAPM.

4. Tax requirements of an irrelevant capital structure

Let us consider equation (17) in relation to the conditions under the present tax system which would be consistent with the MM irrelevant capital structure. Of the four terms on the RHS of equation (17) we require values of zero for the last three. Where gearing is irrelevant, by definition:

$$D + S_L = S_u \quad (20)$$

and

$$gD + gS_L = gS_u \quad (21)$$

Hence from the second term on the right hand side of equation (17) a sufficient condition for neutrality is:

$$(1 - h) = (1 - T) \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) \quad (22)$$

Similarly from the third term:

$$\begin{aligned} & Dk_d[(1 - h) - (1 - T)(1 - g)] \\ & + X_i[(1 - T)(1 - g)] \\ & = X_i(1 - T) \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) \end{aligned} \quad (23)$$

and from the fourth term, by substituting for

$$D = gD + D(1 - g) = D(1 - g) + gS_u - gS_L$$

from equation (21),

$$\begin{aligned} & Dk_d(1 - h) + D(1 - g) \\ & = Dk_d(1 - T) \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) \\ & + D \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) \end{aligned} \quad (24)$$

From equation (22), with no dividend paid, $d = 0$, and

$$1 - h = (1 - T)(1 - g)$$

i.e.

$$h = 1 - (1 - T)(1 - g) \quad (25)$$

Where there is no retention, $d = 1$, and

$$1 - h = (1 - T) \frac{(1 - h)}{(1 - b)}$$

giving $T = b$.

From equation (23), we require for tax neutrality when no retention is made, $d = 1$,

$$(1 - h) = (1 - T)(1 - g)$$

as in equation (25), from the coefficient of Dk_d , and

$$(1 - T)(1 - g) = (1 - T) \frac{(1 - h)}{(1 - b)},$$

from the coefficient of X_i , giving

$$h = 1 - (1 - g)(1 - b) \quad (27)$$

When no dividend is paid, i.e. for $d = 0$, from equation (23) a sufficient condition for tax neutrality is

$$(1 - h) = (1 - T)(1 - g) \text{ as before.}$$

Finally, a sufficient condition for tax neutrality, when no retention is made ($d = 1$), may be obtained from the coefficients of Dk_d in equation (24):

$$(1 - h) = (1 - T) \frac{(1 - h)}{(1 - b)}$$

giving $b = T$ as in equation (26) and from the coefficients of D

$$(1 - g) = \frac{(1 - h)}{(1 - b)}$$

giving $h = 1 - (1 - b)(1 - g)$ as in equation (27). For a full retention, i.e. for $d = 0$, we find from the coefficients of Dk_d in equation (24), $(1 - h) = (1 - T)(1 - g)$ as in equation (25).

Since in the absence of taxation, capital structure is irrelevant to the valuation of the firm under the CAPM (see equation (18) where $T = 0$), the sufficient conditions for tax neutrality are

$$h = 1 - (1 - g)(1 - b) \text{ from equation (27)}$$

and

$$h = 1 - (1 - g)(1 - T) \text{ from equation (25)}$$

$$(26) \text{ giving } T = b \text{ as in equation (26).}$$

Table 2 Conditions for a neutral tax system			
State of nature Dividend policy	Insufficient cash profits to pay interest on debentures	Insufficient cash profits, after interest, to repay debt capital in full	Sufficient cash profits to meet all debt obligations
No dividends	$h = 1 - (1 - T)(1 - g)$	$h = 1 - (1 - T)(1 - g)$	$h = 1 - (1 - T)(1 - g)$
Full dividends	$b = T$	$h = 1 - (1 - T)(1 - g)$ $h = 1 - (1 - b)(1 - g)$	$b = T$ $h = 1 - (1 - b)(1 - g)$

The requirements of a neutral tax system, depending on dividend policy for alternative states of nature, are shown in Table 2.

Conclusion

Finally, the main arguments of the analysis have demonstrated:

- (a) that the current British tax system results in complex tax effects not fully captured by MM's simple model; and
- (b) that tax neutrality of the system is assured if certain, stringent, sufficient conditions are met.

APPENDIX

The relationship between the values of levered and unlevered firms under the imputation system

The symbols used in the text and in this appendix are shown in alphabetical order below:

- b = the basic rate of income tax
- d = the net dividend payout rate
- D = the market value of debt capital in a levered firm
- g = the rate of capital gains tax
- h = the (higher) marginal rate of personal tax on investment income
- k_d = the contractual interest expressed as a proportion of the market value of debt capital, denoted D
- k_{im} = the rate of return on the efficient market portfolio in the i th state of nature
- \bar{k}_m = the mean rate of return on the efficient market portfolio
- $\lambda = (\bar{k}_m - r_F)/\text{var}(k_m)$, where $\text{var}(k_m)$ denotes the variance of the rates of return on the efficient market portfolio
- $\sum_{i=1}^n p_i$ = the probability that the net operating cash flow is insufficient to cover the debenture interest
- $\sum_{i=1}^N p_i$ = the probability that the net operating cash flow will be insufficient to cover in full both the contractual interest and the repayment of debt principal
- p_i = the probability of occurrence of the i th state of nature, where $i = 1$ to ∞ represents all discrete states
- \bar{R}_d = the mean cash return to the holder of a debt security, after all taxes
- \bar{R}_e = the mean cash return to the holder of an

equity security in a levered firm, after all taxes

r_F = the risk-free rate of interest

R_{id} = the cash return to the holder of a debt security in the i th state of nature, after all taxes

R_{ie} = the cash return to the holder of an equity security in a levered firm in the i th state of nature, after all taxes

R_{ij} = the cash return to the holder of security j in the i th state of nature, after all taxes

\bar{R}_u = the mean cash return to the holder of an equity security in an unlevered firm, after all taxes

S_L = the market value of equity capital in a levered firm

S_u = the market value of equity capital in an unlevered firm

T = the full rate of corporation tax

V_L = the market value of a levered firm ($V_L = S_L + D$)

V_u = the market value of an unlevered firm ($V_u = S_u$)

X_i = end of period liquidation value of all the company's assets

There are two assumptions concerning the definition of X_i which need to be made explicit. First, given (a) the choice of a one-period valuation model and (b) the assumption that in states $i = 1$ to N when $(X_i - Dk_d)(1 - T) < D$ then shares are worth zero, then X_i is not net operating cash flow; it is the end of period liquidation value of all the company's assets. This problem makes a difference for tax purposes.

Secondly, it will be stated that in states $i = N + 1$ to ∞ the proportion $(1 - d)$ of the positive excess proceeds $(X_i - Dk_d)(1 - T) - D$ will be reinvested. But it is implicitly assumed that retentions earn only the firm's required rate of return (i.e. there are no quasi-rents).

Now, the amount available for paying dividends is given by the net operating cash flow, less debenture interest, less corporation tax, less the repayment of debt capital:

$$[(X_i - Dk_d)(1 - T) - D] \text{ for } i = N + 1 \text{ to } \infty$$

The dividend paid is

$$d[(X_i - Dk_d)(1 - T) - D]$$

ACT thereon is

$$\frac{b}{1 - b} \cdot d[(X_i - Dk_d)(1 - T) - D]$$

The gross dividend is

$$\left(1 + \frac{b}{1-b}\right) d[(X_i - Dk_d)(1 - T) - D]$$

The higher rate tax on the gross dividend is

$$h \left(1 + \frac{b}{1-b}\right) d[(X_i - Dk_d)(1 - T) - D]$$

The higher rate tax less the tax deducted at source is

$$\begin{aligned} & \left[h \left(1 + \frac{b}{1-b}\right) - \frac{b}{1-b} \right] d[(X_i - Dk_d)(1 - T) - D] \\ &= \frac{h-b}{1-b} \cdot d[(X_i - Dk_d)(1 - T) - D] \end{aligned}$$

Hence the dividend received net of personal tax is

$$\begin{aligned} & \left(1 - \frac{h-b}{1-b}\right) d[(X_i - Dk_d)(1 - T) - D] \\ &= \frac{1-h}{1-b} \cdot d[(X_i - Dk_d)(1 - T) - D] \end{aligned}$$

The mean dividend net of personal tax is:

$$\sum_{i=N+1}^{\infty} p_i [(X_i - Dk_d)(1 - T) - D] \left(d \cdot \frac{1-h}{1-b} \right)$$

Let the value of the shares in the levered firm at the beginning of the period be S_L . For $i = 1$ to N shareholders receive nothing, and the shares are worth zero. With a capital gains tax rate of g , there is a capital loss for tax purposes worth gS_L . For $i = N + 1$ to ∞ a retention is made and hence after paying a dividend the shares are worth, assuming a perfect capital market:

$$[(X_i - Dk_d)(1 - T) - D](1 - d)$$

Capital gains tax for $i = N + 1$ to ∞ is:

$$\{[(X_i - Dk_d)(1 - T) - D](1 - d) - S_L\} g$$

Hence the mean value of the shares after payment of the dividend and after capital gains tax is given by:

$$\begin{aligned} & \sum_{i=N+1}^{\infty} p_i \{[(X_i - Dk_d)(1 - T) - D](1 - d) \\ & - g \{[(X_i - Dk_d)(1 - T) - D] \\ & \times (1 - d) - S_L\}\} + \sum_{i=1}^N p_i g S_L \end{aligned}$$

The mean return to all shareholders in the form of dividends or capital gains, after all personal

taxes, is therefore:

$$\begin{aligned} \bar{R}_e &= \sum_{i=N+1}^{\infty} p_i [(X_i - Dk_d)(1 - T) - D] \\ & \times \frac{(1-h)}{(1-b)} d + \sum_{i=1}^N p_i g S_L + \sum_{i=N+1}^{\infty} p_i \\ & \times \{[(X_i - Dk_d)(1 - T) - D](1 - d) \\ & - g[(X_i - Dk_d)(1 - T) - D](1 - d) + g S_L\} \\ &= g S_L + \sum_{i=N+1}^{\infty} p_i [(X_i - Dk_d)(1 - T) - D] \\ & \times \left(d \frac{(1-h)}{(1-b)} + (1-d) \times (1-g) \right) \quad (1) \end{aligned}$$

By contrast, for a firm financed solely by equity capital, i.e. for $N = 0$ and $D = 0$:

$$\begin{aligned} \bar{R}_u &= g S_u + \sum_{i=1}^{\infty} p_i X_i (1 - T) \\ & \times \left(d \frac{(1-h)}{(1-b)} + (1-d)(1-g) \right) \quad (2) \end{aligned}$$

Therefore:

$$\begin{aligned} \bar{R}_e &= \bar{R}_u - g S_u + g S_L - \sum_{i=1}^N p_i X_i (1 - T) \\ & \times \left(d \frac{(1-h)}{(1-b)} + (1-d)(1-g) \right) \\ & - \sum_{i=N+1}^{\infty} p_i [Dk_d(1 - T) + D] \\ & \times \left(d \frac{(1-h)}{(1-b)} + (1-d)(1-g) \right) \quad (3) \end{aligned}$$

Let us now turn to the after-tax returns to debtholders. First, where the net operating cash flow does not exceed the contractual interest payment, the firm pays no tax and the net operating cash flow is fully paid to debtholders. Where there is no repayment of debt capital the value of the tax loss to debtholders is gD . Therefore:

$$R_{id} = X_i(1 - h) + gD \text{ for } i = 1 \text{ to } n \quad (4)$$

Secondly, where the net operating cash flow exceeds the interest payments but where there is insufficient to repay the debt capital in full then the interest after tax is $Dk_d(1 - h)$; the repayment of debt capital is $(X_i - Dk_d)(1 - T)$, and the value of the tax loss to debtholders is:

$$g[D - (X_i - Dk_d)(1 - T)].$$

Therefore:

$$R_{id} = Dk_d(1 - h) + (X_i - Dk_d)(1 - T) + g[D - (X_i - Dk_d)(1 - T)]$$

for $i = n + 1$ to N (5)

Finally, where the firm has sufficient income after tax to repay the debenture interest and capital:

$$R_{id} = Dk_d(1 - h) + D \text{ for } i = N + 1 \text{ to } \infty \quad (6)$$

Hence:

$$\begin{aligned} \bar{R}_d = & \sum_{i=1}^n p_i [X_i(1 - h) + gD] \\ & + \sum_{i=n+1}^N p_i [Dk_d(1 - h) \\ & + (X_i - Dk_d)(1 - T) + gD \\ & - g(X_i - Dk_d)(1 - T)] \\ & + \sum_{i=N+1}^{\infty} p_i [Dk_d(1 - h) + D] \end{aligned} \quad (7)$$

From equations (3) and (7):

$$\begin{aligned} \bar{R}_d + \bar{R}_e &= \bar{R}_u - gS_u + gS_L \\ &+ \sum_{i=1}^n p_i \left\{ X_i(1 - h) + gD - X_i(1 - T) \right. \\ &\times \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) \Big\} \\ &+ \sum_{i=n+1}^N p_i \left\{ Dk_d(1 - h) + (X_i - Dk_d)(1 - T) \right. \\ &+ gD - g(X_i - Dk_d)(1 - T) - X_i(1 - T) \\ &\times \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) \Big\} \\ &+ \sum_{i=N+1}^{\infty} p_i \left\{ Dk_d(1 - h) + D - [Dk_d(1 - T) + D] \right. \\ &\times \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) \Big\} \end{aligned} \quad (8)$$

Now that we have calculated the mean returns to all security holders, let us investigate the covariances. Since by definition:

$$\text{cov}(R_j, k_m) = \sum_{i=1}^{\infty} p_i R_{ij}(k_{im} - \bar{k}_m)$$

then from equations (8) and (2) we have:

$$\begin{aligned} \text{cov}(R_d, k_m) + \text{cov}(R_e, k_m) &= \sum_{i=1}^{\infty} p_i (k_{im} - \bar{k}_m) \\ &\times \left\{ X_i(1 - T) \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) \right\} \\ &+ \sum_{i=1}^n p_i (k_{im} - \bar{k}_m) \\ &\times \left\{ X_i(1 - h) + gD - X_i(1 - T) \right. \\ &\times \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) \Big\} \\ &+ \sum_{i=n+1}^N p_i (k_{im} - \bar{k}_m) \left\{ Dk_d(1 - h) \right. \\ &+ (X_i - Dk_d)(1 - T) \\ &+ gD - g(X_i - Dk_d)(1 - T) - X_i(1 - T) \\ &\times \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) \Big\} \\ &+ \sum_{i=N+1}^{\infty} p_i (k_{im} - \bar{k}_m) \\ &\times \left\{ Dk_d(1 - h) + D - (Dk_d(1 - T) + D) \right. \\ &\times \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) \Big\} \end{aligned} \quad (9)$$

For an unlevered firm, from equation (2):

$$\begin{aligned} \text{cov}(R_u, k_m) &= \sum_{i=1}^{\infty} p_i (k_{im} - \bar{k}_m) \left\{ X_i(1 - T) \right. \\ &\times \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) \Big\} \end{aligned} \quad (10)$$

But since:

$$V_u(1 + r_F) = \bar{R}_u - \lambda \text{cov}(R_u, k_m) \quad (11)$$

then

$$\begin{aligned} \bar{R}_u &= V_u(1 + r_F) + \lambda \sum_{i=1}^{\infty} p_i (k_{im} - \bar{k}_m) \\ &\times \left\{ X_i(1 - T) \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) \right\} \end{aligned} \quad (12)$$

Now, the CAPM valuation model shows:

$$S_L(1 + r_F) = \bar{R}_e - \lambda \text{cov}(R_e, k_m) \quad (13)$$

$$D(1 + r_F) = \bar{R}_d - \lambda \text{cov}(R_d, k_m) \quad (14)$$

giving

$$V_L(1 + r_F) = \bar{R}_e + \bar{R}_d - \lambda(\text{cov}(R_e, k_m) + \text{cov}(R_d, k_m)) \quad (15)$$

Therefore from equations (12), (15), (8) and (9):

$$\begin{aligned} V_L(1 + r_F) &= V_u(1 + r_F) - gS_u + gS_L \\ &+ \sum_{i=1}^n p_i [1 - \lambda(k_{im} - \bar{k}_m)] \\ &\times \left\{ X_i(1 - h) + gD - X_i(1 - T) \right. \\ &\times \left. \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) \right\} \\ &+ \sum_{i=n+1}^N p_i [1 - \lambda(k_{im} - \bar{k}_m)] \\ &\times \left\{ Dk_d(1 - h) + (X_i - Dk_d)(1 - T) + gD \right. \\ &- g(X_i - Dk_d)(1 - T) - X_i(1 - T) \\ &\times \left. \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) \right\} \\ &+ \sum_{i=N+1}^{\infty} p_i [1 - \lambda(k_{im} - \bar{k}_m)] \end{aligned}$$

$$\begin{aligned} &\times \left\{ Dk_d(1 - h) + D - (Dk_d(1 - T) + D) \right. \\ &\times \left. \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) \right\} \quad (16) \end{aligned}$$

The above expression may be rewritten:

$$\begin{aligned} V_L(1 + r_F) &= V_u(1 + r_F) + \sum_{i=1}^n p_i [1 - \lambda(k_{im} - \bar{k}_m)] \\ &\times \left\{ X_i(1 - h) + gD + gS_L - X_i(1 - T) \right. \\ &\times \left. \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) - gS_u \right\} \\ &+ \sum_{i=n+1}^N p_i [1 - \lambda(k_{im} - \bar{k}_m)] \\ &\times \left\{ Dk_d(1 - h) + (X_i - Dk_d)(1 - T) \right. \\ &- g(X_i - Dk_d)(1 - T) \\ &+ gD + gS_L - X_i(1 - T) \\ &\times \left. \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) - gS_u \right\} \\ &+ \sum_{i=N+1}^{\infty} p_i [1 - \lambda(k_{im} - \bar{k}_m)] \\ &\times \left\{ Dk_d(1 - h) + D + gS_L - (Dk_d(1 - T) + D) \right. \\ &\times \left. \left(d \frac{(1 - h)}{(1 - b)} + (1 - d)(1 - g) \right) - gS_u \right\} \quad (17) \end{aligned}$$

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Performance Assessment in Institutions of Higher Education under Conditions of Financial Stringency, Contraction and Changing Needs: A Management Accounting Perspective*

John Sizer

Many institutions of higher education in Western Europe and North America have entered, or are entering, a period of financial stagnation, falling real income per student, and perhaps actual decline in student numbers during the remainder of this century. Like many other non-profit making organisations, they are increasingly being asked to justify their activities and account for their use of resources and their performance in terms of their effectiveness and their efficiency, not only to external financing bodies but also to other influential groups in society.

Furthermore, within institutions, consideration has to be given to the efficiency of the various academic and service departments, decisions made concerning the allocation of resources, and in some cases decisions have to be taken involving major cutbacks and reallocations of resources. Clearly managements need a sound basis upon which to arrive at and justify such decisions; in particular they need to develop and employ appropriate methods for allocating resources and for subsequently assessing the performance of the component parts of their institutions. Inevitably, there is a demand for performance indicators which will aid, and possibly over-simplify, this process; and for relevant financial information for planning, decision making and control.

In the United Kingdom, institutional performance assessment has to be undertaken against the background of the long-term demographic trends

(Department of Education and Science, 1978 & 1979); the requirement to charge overseas students full economic fees; an emerging policy focus and reorganisation within the Department of Education and Science designed to achieve a capacity to plan rationalisation of further and higher education as a whole; short-term pressures to reduce the level of government expenditure on higher education; and considerable uncertainty as to the level of long-term resource provision. Within institutions there is a need to balance the pressure for increased cost efficiency and possible restrictions on student admissions in the short term with the actions that need to be taken if the organisation is to be effective in the long term.

Various aspects of institutional performance assessment under conditions of financial stringency, contraction and changing needs have been examined elsewhere by the author (Sizer, 1979a, c, & 1980); this paper concentrates upon management accounting aspects. In particular it is argued that academic accountants should take a greater interest in performance assessment within their institutions. At the outset it must be recognised that effectiveness and efficiency are elusive concepts in higher education, and that the process of institutional performance assessment carries with it potential liabilities which warrant careful consideration (Romney, Bogen and Micek, 1979).

What do we understand by the term 'effectiveness', and should a distinction be drawn between *effectiveness* and *efficiency*? Is an organisation effective if it achieves the objectives it has set itself, and should those objectives be appropriate to the needs of society? Is it *efficient* if it achieves

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those objectives with optimal use of the resources available to it in the long run? What is the relationship between effectiveness, efficiency and performance assessment? Is institutional performance assessment concerned with the measurement or observation of the effective and efficient accomplishment of the expectations of the institution's constituencies (Romney, Bogen & Micek, 1979)? Is it an examination of the objective achievement process, which consists of at least four distinct stages: in which objectives are set; resources are committed for the purpose of achieving these objectives; committed resources are expended to achieve the objectives; and outcomes result (Romney, Gray & Weldon, 1978)? If it is, should indicators of performance be viewed in this context?

Objectives for institutions of higher education

Non-profit making organisations, such as institutions of higher education, exist to provide a service. Not only are services provided more difficult to measure than profits, so is the process of identifying, quantifying and agreeing an overriding objective in such organisations; developing a hierarchy of primary and secondary objectives that flow from this overriding objective; and subsequently measuring and comparing actual performance against these objectives. These difficulties, which are central to the process of performance assessment, are particularly acute in institutions of higher education.

Is an institution of higher education *effective* if it achieves objectives which are appropriate to the economic, socio-political, technological, ecological, and educational environment in which it operates? Should its objectives be congruent with the long-term needs of society? Many of those involved in the management of institutions would probably answer such a question positively. However, would they be able to reach agreement on the long-term needs of society, the contribution their institution should make to satisfy those needs, and the objectives for their institution?

In his book, *The Effective University: A Management by Objectives Approach*, Norris (1979) argues that:

Until the goal question is resolved and meaningful priorities set for institutional policy as a whole, it is impossible to say what is really important for that institution, and hence where resources should be allocated.

He asks whether the time has now arrived for setting and obtaining agreement upon objectives. A study conducted in 1976 by Romney (1978) for the National Center for Higher Education Management Systems of measures of institutional goal achievement is relevant to this question. Romney undertook a survey of 1,150 persons—faculty, administrators and trustees at 45 American colleges and universities of six different types—which surprisingly indicated that faculty, administrators and trustees largely agreed on what their institution's goals should be. Respondents were asked to rate with respect to appropriateness for their institution twenty broadly stated institutional goal areas. Goal preference generally varied across institutional types, but there was a large degree of agreement among trustees, faculty and administrators within institutional types.

However, even if agreement can be reached on the broad objectives for an institution, can these be translated into agreed quantifiable goals and desired performance indicators? What weighting should be given to the different objectives, and how should conflict between objectives be resolved? If it cannot, how can more detailed objectives and performance indicators be established to measure effectiveness and efficiency for the component parts of the institution? In some academic departments, particularly large multi-discipline departments, could agreement be reached amongst members as to what the objectives are for the department, for the courses offered by the department, and for the research programmes undertaken within departments? Therefore, where do members of academic departments, heads of academic departments, and deans fit into the spectrum ranging from goal conflict to striving towards goal congruence within institutions of higher education? Does today's environment encourage goal congruence or goal conflict within institutions?

Planning and control systems

A management accountant might argue that at a time when resources are scarce and likely to become more so, there is an obvious need for a planning and control system structured around areas of *responsibility* which will permit the organisation to plan and subsequently to measure its progress towards effectiveness and efficiency. Such systems may be seen to act as positive motivators by encouraging responsible managers to plan and control their own performance. They recognise in part or in whole that planning is the

basis of control and that the process is a continuous one and comprises: analysing historical performance and existing provision; forecasting the future economic, socio-political, technological, industrial, and educational environment to identify long term needs of society; developing long term objectives relevant to these needs; agreeing performance indicators that measure progress towards these objectives; formulating strategies to achieve these objectives and hence to close the gaps, if any, between existing provision and perceived future needs; translating these strategies into operating plans for the medium term and more detailed budgets by responsibility centres for the current year; allocating resources in accordance with these plans; motivating people to achieve these plans, recognising that planning and control systems themselves influence behaviour both positively and negatively; continually comparing actual with planned performance and establishing the feedback to improve short run managerial performance and to update, modify and improve longer term planning and the effectiveness of the planning and control system itself. Within the framework of such long-term and short-term planning and control systems, institutions and financing bodies would appraise individual investment decisions (capital projects, new course proposals, etc.) and short-term tactical changes (course changes, class sizes, etc.).

Such long-term planning and short-term budgetary planning and control systems are used extensively in profit-making organisations. Such systems are particularly attractive in those situations where the product is well-defined and can be measured, the economic and socio-political environment is stable or is changing only slowly, the technology is established, innovations are infrequent, and the precise nature of the relationship between inputs and outputs is known. In these circumstances the implementation problems of the planning and control cycle are likely to be largely behavioural not technical, and mathematical models can be developed to facilitate a rational allocation of resources.

On the other hand, in those situations where joint costs and products are normal, the external environment is complex and unknowns obscure the horizon, the 'production function' is not defined, and the ultimate impacts of the outputs of the organisation are long term, as many profit-making organisations have discovered, such systems require a great deal of exacting and time-consuming effort and may still fail to cope adequately with the ambiguity, complexity and

uncertainty. Institutions of higher education come into this category. Not only may some institutions be characterised by goal conflict rather than by striving towards goal congruence, they also have joint inputs and multiple outputs and outcomes, the ultimate impact of which is extremely hard to measure. In these circumstances it is difficult to develop not only long-term planning systems and resource allocation models, but also performance indicators which measure the effectiveness and efficiency of the institution as a whole. One attempt to adapt such systems to non-profit organisations was reflected in the development of Programme Planning and Budgeting Systems. More recently efforts have been directed at the development of inter-active computer based financial planning models.

Non-profit performance evaluation techniques

Have attempts to apply non-profit performance evaluation techniques, such as Programme Planning Budgeting Systems (PPBS) and Cost Benefit Analysis (CBA), to institutions of higher education been successful? Both techniques attempt to relate costs to outcome assessments. They require the introduction of cost collection and allocation systems. While allocation of joint costs poses many problems, it is the measurement of outcomes that is the critical factor in their rejection. PPBS requires the specification of objectives which can be readily transformed into outcome quantities and statistics, and CBA the transformation of essentially non-monetary outcomes into monetary outcomes. Thus, Balderston (1974) states that:

Because the operational definition of objectives and the measurement of achievement towards these objectives are still difficult and incompletely resolved, the dream of planning towards long range goals and budgeting for results remains (some would say blessedly) incomplete.

Drawing upon an extensive review and critique of PPBS in higher education undertaken with G. B. Weathersby (1972), Balderston observes that the specifics of measurement of the quantity and quality of results achieved are not very far developed; that a university abounds in multiple processes, and the analysis of costs and results in the presence of substantial jointness and inter-dependence is difficult; and that the problem of time horizons has proved to be, politically, the most

serious of all, because funding sources were unwilling or unable to look beyond very short commitments—typically, the single budget year. Recent research by Gambino (1979) revealed that in almost all cases attempts at implementation of PPBS were facing serious obstacles. Phyr (1973) has argued that Zero Base Budgeting (ZBB) can be used to reinforce PPBS, and MacFarlane (1976) has discussed its application at McMaster University. However, like PPBS, ZBB relies heavily on the quantification of outcomes which, as will be argued later, we still do not yet know how to measure. However, Balderston decides that:

The most enduring legacy of the program budgeting experience of universities has been the development of a much more sophisticated analytic spirit, both within the university, and in state and federal agencies. (Balderston, 1974)

The proponents of PPBS did successfully identify a series of strategic weaknesses in the planning and management of public resources (Dennison, 1979).

If PPBS, which aims at directing resource allocation, according to the objectives of institutions, and subsequently comparing actual with planned performance, is not feasible, can this legacy be built on in the development of performance indicators for the various activities that take place within institutions of higher education? Balderston (1974) sees that the spirit of informed inquiry, leading to more careful evaluation of alternatives and rational decision making, can be realised in *policy analysis* without 'the formal baggage of PPBS'. Thus, he and Weathersby (1972) wrote that:

The approach of policy analyses is to bring careful analysis to bear incrementally in specific decision problems and build a planning and management 'system' on a case law of precedent basis.

Similarly, Östergren (1977 & 1978) sees *activity evaluation*, or *institutional self-evaluation*, as providing 'a starting point for the reappraisal and alteration of activities':

Certainly the emphasis is on developing the institution's own capacity to critically examine its organisation and activities, to reorder its priorities, to raise its effectiveness, efficiency and innovative capability.

Similarly, Romney (1978) suggests '... consensus building techniques can facilitate the selection of appropriate goals and measures within institutions.'

Can we see a logical development from quantitatively based PPBS and CBA techniques, towards the increasing interest in quantitatively and qualitatively based participatory institutional self-evaluation, and consensus building techniques? Will inter-active computer based financial planning models assist consensus building?

Inter-active financial planning models

One way large profit-making organisations have attempted to cope with the increasingly uncertain and dynamic environment over the last decade, has been through the use of computer based, inter-active financial planning models. Some universities have utilised similar models. For example, Stanford University has developed an inter-active computer model called TRADES (Dickmeyer, Hopkins and Massey 1978). TRADES is a convenience term for 'trade-offs'. It was developed to provide answers to such questions as: 'Can we keep tuition fee increases down and give our faculty the pay rises they deserve?' 'If utility prices continue to rise can we still allocate a portion of our budget to new programs?' With TRADES Stanford's administrators have also sought to implement some more dynamic concepts, such as planning the transition to equilibrium of a university budget during periods of high inflation and consequently falling real income (Massey, 1976, and Hopkins and Massey, 1977). This work was directed towards achieving budget equilibrium within a relatively short period of time, say, three to five years, under deterministic conditions. More recent work (Grinold, Hopkins and Massey, 1978) has been directed towards finding optimal control policies for the university's budget over an indefinitely extended future and under conditions of uncertainty. More specifically, the Stanford administrators are seeking measures to stabilise budget growth over the longer period in face of major uncertainties about the future course of inflation, endowment returns, and other external economic factors; a not unfamiliar problem facing British universities.

Such models do not dismiss the uncertainty surrounding university planning, but they assist in understanding the nature of the uncertainty. They allow administrators to test the sensitivity of the plans to variations in key variables, to evaluate trade-offs and test tactical decisions, to revise

plans quickly when variations in key variables do take place, and to identify key future performance indicators relating to the primary planning variables. The availability of such models in British universities would have facilitated the preparation of a response to a request from the University Grants Committee to consider the effect on student and staff numbers of three possible levels of allocation for home students in terms of pay and prices ruling at 31st July 1979 for the quadrennium 1980/81 to 1983/84. The responses were prepared against the background of a phased introduction of fees for overseas students based on the full costs of providing their education and the possibility that the allocation for home students may not be supplemented in full for future pay and price increases. The models might have been used to test the sensitivity of financial forecasts to variations in numbers of overseas students, staff-student ratios, 'incremental drift' (i.e., the difference between average salaries paid by the university and the mid-point in the scales provided by the UGC), supplementation for inflation, changes in student mix by course, etc.

Also, at Stanford, the basic concepts of the model proved to be explainable to a wide audience and provided the administration with a rationale for what by all odds was going to be a bitter pill of budget-reduction medicine. Thus, they assisted consensus building within the university. British universities are currently in the process of responding to similar medicine.

'Partial' performance indicators

Given the complexities and difficulties surrounding the objective setting and planning process, and the difficulties associated with non-profit performance evaluation techniques and multi-dimensional analysis, it is not surprising that there is a tendency to recognise those parts of the system that can be measured and monitored with a considerable degree of precision. While it may not prove possible to agree objectives, measure outcomes and develop performance indicators for an institution as a whole, it often proves possible to do so for parts of the organisation; i.e. to develop performance indicators that relate physical and monetary inputs to physical and monetary outputs and outcomes, and to build these into the planning and reporting system. However, do those who develop and employ such partial performance indicators always remember that optimising the parts does not necessarily optimise the whole?

Sorenson and Grove (1977) have summarised

the objectives and properties of various service performance indicators: availability, awareness, accessibility, extensiveness, appropriateness, efficiency, effectiveness, outcomes/benefits/impacts, and acceptability. From these, the author has developed partial performance indicators for institutions of higher education (Table 1) (Sizer, 1979b). Many of these partial performance indicators are traditional *process measures* of institutional performance, such as staff-student ratios and cost per FTE, rather than *outcome measures* or ones that substantiate progress towards achieving objectives. As might be expected, traditional process measures of institutional performance were rejected by almost all categories of respondent in the Romney (1978) study. Objective measures pertaining to impacts of higher education such as satisfaction, ability to apply knowledge, publications, and value added were most preferred.

No doubt Romney's respondents would argue that if an effective institution of higher education is one which achieves objectives which are appropriate to the economic, socio-political, technological, ecological and educational environment in which it operates, its effectiveness should be measured in terms of outcomes/benefits/impacts of its teaching and research programmes on society. There is a danger in using short-term input indicators of performance, such as cost per full-time-equivalent student or cost per graduate, that sight may be lost of the long-term measure of the effectiveness of institutions, i.e. their contribution to the needs of society. A head of an academic department may argue that while his cost per FTE student compares unfavourably with other similar departments in his own and other institutions, the long-term impacts/benefits of the research and teaching programmes in his department compare favourably and outweigh the higher costs. Furthermore, questions concerning the quality of outcomes and their impact on society are bound to be raised by governments determined to get better value for public expenditure in higher education. In other words, short-term quantitative input and outcome measures and performance indicators are inadequate, and quality of outcomes and long-term impacts/benefits should be assessed:

If the management of retrenchment is to preserve excellence, however, there must be some way of obtaining quality assessments and use them for making selective priority decisions. (Balderston, 1979)

Table 1
Properties of Performance Indicators in Higher Education

<i>Focus of Measure</i>	<i>Conceptual Content</i>	<i>Tells</i>	<i>Examples</i>
<i>Availability</i>	Amount and type of course, research facility, or central service provided	What can be obtained	List of services available in careers advisory service; list of research facilities and opportunities available in academic department; number, capacities, and locations of lecture and seminar rooms.
<i>Awareness</i>	Knowledge of user population of existence; range and conditions for entry or use of courses, research facilities, or central services	Who knows about what is available	Knowledge of prospective students of courses offered by an academic department. Knowledge by prospective users of services provided by central computer centre.
<i>Accessibility</i>	Indicates if services can be obtained by appropriate groups	Ease of reaching and using facility	Availability of photocopying facilities; location of car parks; average waiting time for literature search by library information service; opening hours of medical centre.
<i>Extensiveness</i>	Compares quantity of services rendered with capacity available and/or potential demand	'How Much' but not 'How Well'	Students enrolled on courses compared with course quotas; number of users of library; clients in medical centre; percentage of final year students using careers advisory service; percentage utilisation of lecture and seminar rooms.
<i>Appropriateness</i>	Correct type and amount of service rendered, course offered, or research undertaken	Is quantity and/or quality of facility offered that required?	Demand for courses: number and quality of applicants; mis-match between computing facilities required and available; comparison of class sizes to lecture and seminar room capacities.
<i>Efficiency</i>	Compares resource inputs with outputs	How much resource was used such as —how much did it cost per unit? —how much did it cost in total? —how much time did it take? —what grade of employee was used?	Cost per client service in medical centre. Cost per FTE student by course. Cost per literature search. Cost per meal served.
<i>Effectiveness</i>	Compares accomplishment with objectives (or what was intended) —Qualitative —Comparative	Characteristics Duration Content Effect Proportions served Variances from budgets, standards	Comparison of planned with actual: percentage utilisation of lecture and seminar rooms; number of students graduating; number of graduates employed; ratio of actual utilisation to planned utilisation of computer; comparison of budgeted cost of central service with actual cost; comparison of actual cost per FTE for course with planned; comparison of planned course content with actual course content; actual wastage rate compared with planned wastage rate.
<i>Outcomes/ Benefits/ Impacts</i>	Identifies social or economic benefit	Monetary effects Non-monetary effects	Increase in earnings arising from attendance at/ graduating from course; benefits to society of successful research into previously incurable disease; benefits to local community of cultural programme; patents and copyrights registered.
<i>Acceptability</i>	Assesses match of service/course/ research outcomes with user/ participant preferences	User satisfaction with services Student satisfaction with courses Client satisfaction with outcome of sponsored research	Demand for courses; number of complaints to librarian; course evaluation at end of lecture programme; repeat sponsoring of research.

This argument is fine and logical, but the difficulties involved in developing impact/benefit/outcome measures, and incorporating them into management information systems, should not be underestimated. It is likely that highly sophisticated research designs will be required, which will not only prove expensive but involve a degree of complexity which may be regarded as impractical, probably rightly so, by administrators. The fact is that the art of measuring the outcomes remains in a distinctly primitive state, and we do not know how to measure the quality of institutional, research and community-service outcomes (Romney, 1978). Nevertheless, it may well be that the time is right in many European countries to attempt to assess the quality of institutions, and the social value of different disciplines.

It is not surprising that during the expansionary 1970s administrators and decision makers tended to fall back on to quantitatively based process measures even though they knew these were inadequate measures of institutional effectiveness. Admittedly many of these measures (such as staff-student ratios, and cost per FTE) are relevant to decisions regarding internal planning, control and resource allocation, and for measurement of efficiency as opposed to effectiveness. As Delany (1978) has pointed out, the function of control '... does not cover other aspects of the problem of policy making which deal with the quality of outputs.' It is concerned with the relationship between expected and actual inputs, and expected and actual outputs. Romney (1978) suggests that:

A good many legislators are quite willing to admit that the heavily numerical, efficiency-based accountability perspective is inappropriate to higher education,

and considers institutions should concentrate, for the purposes of assessing institutional effectiveness, upon the development of measures that substantiate progress towards achievement in those few goal areas that constituencies consider appropriate. At the present time there is a strong case for developing *progress measures* of performance in addition to *process measures* and *measures of outcomes/benefits/impacts*.

Despite Romney's view (1978) that much research is needed regarding the translation of institutional goals into measurable, observable objectives, there is considerable pressure in many European countries for a concerted effort to be

made to develop and obtain agreement within institutions on their academic policy and objectives for the 1980s and into the 1990s. In looking forward into the 1980s and on into the 1990s in response to demographic trends, should not institutions examine the environment in which they will be operating and attempt to identify what the needs of society will be, given this environment? Inevitably it will be argued that we are not very good at forecasting the future needs of society, but surely it is better to attempt to identify and satisfy future needs than to assume in a rapidly changing society that today's needs (frequently measured in terms of applications from school leavers) are the best indicators we have of future needs? Furthermore, it is often argued that because we cannot plan very effectively in the short-term at the present time, there is little point in attempting longer-term planning. This argument confuses problems arising from short-term financial uncertainties with the need to examine the impact of long-term trends on an institution's portfolio of activities, and to develop a strategy for the institution's long-term development.

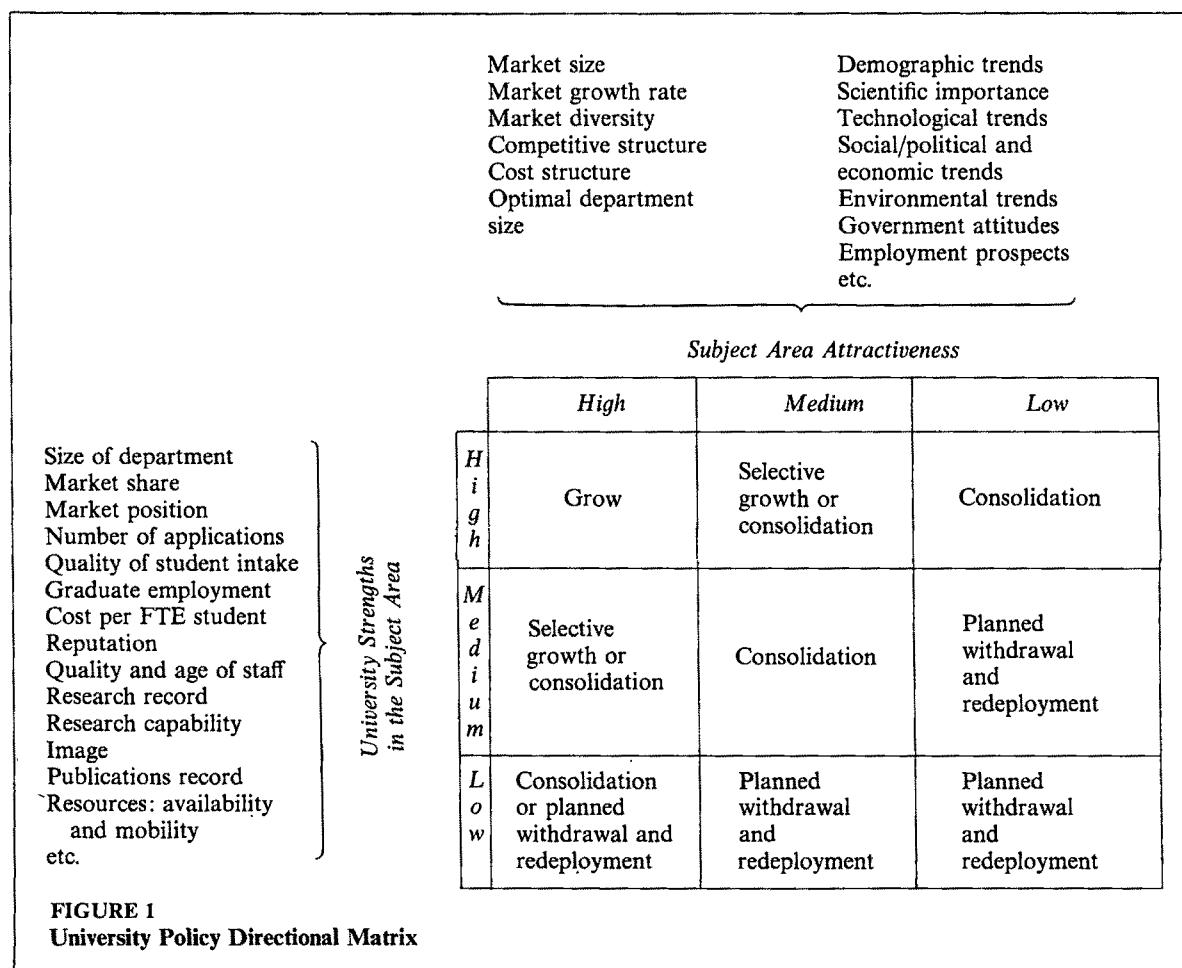
The author has identified elsewhere (Sizer, 1980) some of the trends which are influencing, and will continue to influence significantly, the environment in which institutions of higher education in Western Europe will be operating. Consideration of these trends indicates that it is not simply a question of examining the impact of falling numbers on the higher education system, but that it is also necessary to recognise that society is likely to require a different mix of outputs from the system than at present. Thus Jochimsen (1979) has argued that while '... a policy directed towards preserving, and making the necessary improvements to, the standards of efficiency at universities can be implemented only if members, professors, administrators and students join in a new effort', an essential pre-condition for such an effort is that 'policy makers and society in general can really be convinced that such higher education institutions are not only willing to fulfil, but are also capable of fulfilling, the tasks required by them from the societal aspect.' Is it important that institutions recognise these trends and not only plan for declining numbers, but also for the need for *resource mobility* on the one hand and for research in anticipation of new course demands, research and consultancy opportunities on the other? *Therefore should the performance of an institution be assessed in terms of its responsiveness to these changing needs of society and appropriate performance indicators be developed to*

measure an institution's progress in responding to these changing needs?

An examination of the planning and managerial implications of this conclusion is beyond the scope of this paper. It has been argued elsewhere (Sizer, 1980) that institutions need to compare *strengths* in various subject areas relative to other institutions with the *future attractiveness* of subject areas to provide a starting point for internal discussions on the institution's long-term strategy for resource mobility. The policy directional matrices employed by the American General Electric Company (Allen, 1978) and the Shell Group (Robinson, Hichens & Wade, 1978) have been adapted for this purpose. As will be seen from Figure 1, it is envisaged that such a strategy would classify subject areas into *growth*, *consolidation* and *withdrawal and redeployment* areas. The agreed strategy would need to be translated into a detailed action plan including key result areas. Measures to assess *progress* towards implementing the strategy, particularly in these key

result areas, would flow from the plan. Under conditions of financial stringency and uncertainty, do institutions need to complement their long-term strategy for resource mobility with a short-term strategy for financial emergencies (Donaldson, 1970) and a medium-term strategy for financial mobility (Donaldson, 1969)? The existence of computer based financial planning models facilitates the preparation and updating of such strategies.

The strategic planning approach advocated elsewhere (Sizer, 1980) should enable institutions to develop a set of alternative strategies and operating plans including strategies for *long-term resource mobility*. As changes in the external environment occur the range of strategies can be narrowed down and the appropriate strategy and operating plan implemented. It is hoped that the existence of parallel plans for short-term financial emergencies and medium-term financial mobility will ensure not only an appropriate *speed of response* to a rapidly changing external environ-



ment which is compatible with the strategy for long-term resource mobility, but also increased *flexibility* in planning. It will help to ensure that an appropriate balance is obtained between the pressure to increase cost efficiency in the short-term and actions needed to be taken if the organisation is to be effective in the long-term.

Tests of appropriateness

Clearly, a whole range of process, outcome and progress performance indicators should be considered when establishing appropriate indicators for the research, teaching and central service functions within an institution of higher education. Given that higher education abounds with joint inputs and multiple outputs and outcomes, and the ultimate impact of many of the outcomes is long term and extremely difficult to measure, what tests should be applied to various possible indicators to determine whether they are appropriate for the purpose intended? Can the American Accounting Association's *Statement of Basic Accounting Theory* (1966) standards be applied to performance indicators in higher education? These are the standards of relevance, verifiability, freedom from bias, and quantifiability. It should be recognised at the outset that *trade-offs* frequently have to be made between standards.

1 Relevance

Should relevance be the dominant test applied to any proposed or existing performance indicator? Is a relevant performance indicator one which bears upon the activity or is useful to those concerned with managing that activity? Who determines 'relevance'? While the administrator should provide guidance, should it be the decision maker, either an individual responsible for the function to which an indicator relates or a policy committee, that oversees the function? Do we always recognise that a performance indicator may be relevant for the purpose for which it was developed, but not relevant when used for other purposes?

Accountants will recognise that one of the major problems facing those who wish to produce (for internal planning, control, and resource allocation purposes) financial performance indicators for the research and teaching functions in higher education is the unscrambling of joint costs of research and teaching functions and the central services that support them. It may be wise to recognise at the outset that it is not possible to unscramble the joint costs, and that any attempt

to do so is riddled with assumptions that do not stand up to objective assessment and criticism. Most attempts to unscramble joint costs in institutions of higher education appear to employ an absorption costing approach to produce full costs; for example, see Cossu's study (1978) of costs in university planning systems such as CAMPUS, RRPM and TUSS.

Do university administrators who use such approaches to generate and supply financial indicators not only test their cost allocation procedures against the standards of relevance, verifiability, etc. but also explain the assumptions underlying the indicators, and the uses that can and cannot be made of them, to those who receive and use the indicators? Do they always recognise that:

- (i) There is no one way of apportioning joint costs to cost centres or absorbing joint costs into cost units. It is quite possible that two equally competent accountants would arrive at different unit costs from the same basic data.
- (ii) In institutions of higher education a high proportion of the costs are fixed or period costs, therefore, the average costs are unsuitable for determining the *incremental costs* of extra or fewer students, changes in course design, etc.; or the *avoidable costs* if a department is closed, a course no longer offered, etc.
- (iii) Methods that allocate staff costs on the basis of diary analysis, timetable analysis, etc. do not answer the question: If the lecturer were not lecturing to this course, what would he be doing with his time? If the lecturer has to allocate his time to competing demands, is the cost of his meeting one demand the best alternative foregone, i.e., the *opportunity cost*, not the *sunk cost* of the salary he will be paid regardless of how he allocates his time?
- (iv) Such systems do not consider *societal costs* of higher education, such as the opportunity costs and benefits to society of students attending institutions of higher education.

2 Verifiability

The AAA *Statement* (1966) defines verifiability as 'that attribute of information which allows qualified individuals working independently of one another to develop essentially similar measures or conclusions from an examination of the same evidence, data, or research'. In institutions of higher education is this an extremely important standard, when, for example, a performance indicator, such as a staff-student ratio,

is applied across a number of teaching departments, and subsequently forms an input into the resource allocation process? Is it unlikely that the absorption costing systems referred to above would meet this standard? Does the standard of verifiability aim at protecting the teaching department from arbitrary subjective judgements by those who use the data, and protect the user from similar judgements by those who generate the data? Given the democratic nature of institutions of higher education, is verifiability essential if harmonious relations are to exist between administrators and academics, and between heads of departments and units and resource allocating committees? If one accepts the continuing need for verifiability, one also recognises the importance of reliable initial source data, data banks, and appropriate management information systems.

3 *Freedom from Bias*

Should the performance indicator be free from both *statistical* and *personal* bias? Statistical bias can result from inappropriate techniques of measurement, and 'personal' bias from conscious manipulation of information for personal gain. This leads to the questions: Are the techniques of measurement appropriate? Can the performance indicator be manipulated by individuals to their advantage?

4 *Quantifiability*

How important is this standard to performance indicators in higher education? It may be necessary to trade-off between quantifiability and relevance. Care must be taken not to give greater weights to quantifiable but less relevant indicators, than to non-quantifiable but relevant indicators. For example, number of research publications may be less relevant than the quality of research papers. The quality of lecturers' performances in classrooms may be more relevant than their average lecture hours. Östergren (1977) has recognised that 'activity evaluation is very liable to be dominated by those aspects of activities and results which are more amenable to quantitative description'. He asks: 'How can a proper balance be struck between qualitative and quantitative aspects?' Reports on French experience (Cuenin, 1978 and Fardeau, 1978), and studies conducted by NCHEMS (Lawrence, Weathersby and Patterson, 1970; Micek and Arney, 1974; Micek and Walhaus, 1973) and Chan (1978) in the United States, confirm that this is a particularly relevant question when considering research performance

indicators. Furthermore, as Romney (1978) has pointed out, if the external financing bodies continue to emphasise indicators of process, rather than progress, effectiveness and efficiency when assessing institutions, administrators and faculty will begin, or continue, to function in accordance with incentive structures which are not consistent with an institution's goals and objectives. (See for example examinations by Gross (1979) of formula budgeting and financing of public higher education in the United States, and by Cuthbert and Birch (1979) of the operations of the Advanced Further Education Pool in the United Kingdom.) Nevertheless, are relevant quantifiable performance indicators more likely to meet the tests of verifiability and freedom from bias, than relevant qualitative and non-quantitative indicators?

A fifth standard proposed by the AAA Committee on Managerial Decision Models (1969) should also be applied to performance indicators in higher education:

5 *Economic Feasibility*

Having established appropriate performance indicators in the areas of teaching, research and support services, accountants will recognise that an information system has to be developed for reporting physical measures of inputs and outputs and financial indicators, such as unit costs, and agreed measures of progress towards institutional objectives developed by consensus building techniques, to responsible management. However, will the cost of producing the performance indicator be outweighed by the benefit derived from its availability and use by decision makers? Economic feasibility is part of the trade-offs between relevance, freedom from bias, and verifiability. Fortunately, as the AAA Decision Models Committee (1969) has pointed out, in institutions of higher education, as in other organisations:

... the costs of gathering, storing, and presenting information are expected to decline in the future, so the standard of economic feasibility may be expected to encourage rather than deter requirements in information systems.

For example, the TRADES model allows administrators at Stanford to assess rapidly the effects of different assumptions and present outputs of a highly relevant nature at about 60 cents a run! (Hopkins and Massey, 1977)

Balderston (1974) has argued: 'Universities will do well to install the best data systems they can afford and tolerate'. On the other hand, many

would agree with Romney's view (1978) that 'Throughout higher education the potential for information overload is overwhelming'. While Somit (1979) has suggested that 'So long as universities enjoyed constantly increasing funding the fallacy that management decisions could be based entirely on "information" if only we have enough, remained unchallenged. When that era ended, the inherent limitations of data and of systems which provided them became all too apparent.'

In theory the manager of a responsibility centre, be it a service department, an academic department, or a research centre, should be required to agree objectives; to quantify targets; to evaluate and choose between alternatives; to plan and budget for the resources required; to organise, motivate and direct those resources; and to compare actual performance against the plan, and, when appropriate, take action on adverse deviations. The design and implementation of an information system to support this range of tasks is a demanding exercise even where objectives are clear cut, the output is well defined and input-output relationships established. It has been emphasised that it is immensely more difficult in higher education '...given the intangible and inherently immeasurable nature of the values which pervade higher education and which in the long run determine our actions' (Somit, 1979). Nevertheless, society and financing bodies are not prepared to exempt education managers from assessment in terms of their effectiveness and efficiency, and certainly they should be encouraged to assess their own performance. Therefore, despite Romney's and Somit's observations, provided the information system meets the standard of economic feasibility, should it concentrate on:

- (a) providing a base for planning and controlling *resource utilisation*;
- (b) monitoring the level of *response* to and *outcomes* of the institution's provision of learning opportunities, research facilities, and central services and expressing these responses in the form of non-financial and financial, quantitative performance indicators; and
- (c) monitoring agreed *measures of progress* towards institutional goals developed by consensus building techniques, so as to provide a meaningful starting point from which qualitative managerial judgements can be made?

The Centre for Educational Research and Innovation of OECD has published comprehensive studies of management information systems for

higher education and institutional resource allocation models in higher education (Hussain, 1976 and 1977).

6 Institutional Acceptability

Porter (1978) has proposed that a further test be added to the five standards:

The measures of performance adopted may not themselves be the most reliable indicators of effectiveness or even efficiency but they could be justified if they lead to improved performance or decision taking even though they themselves may not be thoroughly sound intellectually. What is vital is that the people using the indicators should accept them, and the basis on which they are devised, as relevant and fair.

Is Porter recognising the political realities of institutions of higher education? As Argyris (1970) has pointed out:

New developments for rational decision making often produce intense resentment in men who ordinarily view themselves as realistic, flexible, definitely rational. Managers and executives who place a premium on rationality and work hard to subdue emotionality, become resistant and combative in the back-alley ways of bureaucratic politics when such technologies are introduced.

Could 'heads of departments and units' be substituted for 'managers and executives' in Argyris' statement? Thus, is Romney (1978) right to argue, like Porter, that consensus building techniques, such as those described in his study, can facilitate the selection of appropriate goals and measures with institutions? Will such approaches result in economy of information by concentrating on the few highly appropriate goal areas for which a consensus exists, rather than trying to document progress in every goal area that has been accorded some degree of appropriateness?

On the other hand, should we recognise that such consensus building might be more easily achieved when resources are relatively abundant than when they are relatively scarce? A recent study undertaken by Hills and Mahoney (1978) of the nature of budget decision making in a university is relevant to this question. Their research indicated that relative abundance or scarcity of resources available for allocation is a significant influence in the budgeting process. They found that, while precedent was a significant influence in

both situations, it was the *predominant* influence in the allocation of discretionary budget increments under conditions of abundant resources and a *secondary* influence under conditions of scarce resources. In this American study the *predominant* influence during the period of scarce resources was externally based power represented by the existence of advisory boards; an influence not readily apparent during periods of abundant resources. Furthermore, a bureaucratic, or universalistic, criterion, relative workload, was influential in the period of abundant resources but had little influence during the period of scarce resources. Hills and Mahoney (1978) consider their results suggest that 'subunit budgeting is a process designed, in part, to ameliorate conflict and to maintain apparent harmony. This is accomplished by the allocation of discretionary resources according to accepted standards (workload) and a proportionate, or fair share, criterion during periods of relative abundance of resources'. This practice is consistent with Porter's standard of institutional acceptability.

Many of the resource allocation models (such as RRPM and CAMPUS) described by Hussain (1976) employ an induced course load matrix to generate resource entitlement by department. In an interesting critique of the Planning System employed at the University of Aston in Birmingham, Houghton, Mackie and Pietrowski (1979) highlight the limitations of relative workload criteria as a basis for resource allocation under conditions of stagnation and financial stringency:

The major characteristic of Aston's planning procedures, of which it has been justly proud in the past, is that it has been structured on a quantitative basis so that, in theory at least, academic departments forming the input can establish the output for themselves. A quantitative system, however, based largely on immediate past practice and the outcome of the previous year, can only function effectively in an expanding situation... In a steady state or reducing situation however, such as that now facing British universities, Aston's system allows little room for manoeuvre since there are in the plan no firmly established priorities as such: these have been expressed only in the broadest sense... Thus the matching of academic planning desires with the financial resources available can only be achieved by cutting across the spectrum equally, or in planning jargon, 'rateably reducing'. The academic

plan becomes a race in which everyone wins a prize but no one gets the gold medal.

Hills and Mahoney's research suggests that during periods of scarcity of resources, 'it is the powerful subunits that emerge to claim their resources at the expense of other subunits. Further it is the external ties that subunits have which they can use as this power base.' Under these conditions, is 'cutting across the spectrum equally' acceptable to heads of powerful departments and do institutional acceptability and consensus building evaporate in the 'back-alley ways of bureaucratic politics'? Nevertheless, it is suggested that these standards: relevance, verifiability, freedom from bias, quantifiability, economic feasibility, and institutional acceptability, can usefully be applied to existing and proposed performance indicators in institutions of higher education.

'Managers of change'

It is in the context of the back-alley ways of bureaucratic politics that the author frequently poses the question:

Can you manage change and achieve resource mobility during a period when institutions are likely to be more concerned with coping with the pressures of revised student numbers and lower provision per FTE? In other words, will the senior academics and administrators, the managers of change, in institutions of higher education be so concerned with today's problems that they will not give adequate consideration, and make appropriate plans, to cope with tomorrow's problems, particularly when many of these managers of change may have retired before the 1990s?

As Richard Cyert (1977), the distinguished organisational theorist and President of Carnegie-Mellon, has emphasised:

The trick of managing the contracting organisation is to break the vicious circle which tends to lead to disintegration of the organisation. Management must develop counter forces which will allow the organisation to maintain viability.

Furthermore, in the United Kingdom, it is important to recognise that although there are parallels with earlier periods of low growth in institutions,

significant changes have taken place in the status and attitudes of university lecturers. They feel there has been a significant lowering of their status in society and they have been badly treated by the Government. They will face higher teaching loads at a time when their career opportunities have diminished significantly. Not only will they have less time for research, but, if there are few promotional prospects, they may well not feel motivated to undertake research of the type needed to cope with the dynamic changes in society anticipated (assuming research grants are available), and the union that represents them may not accept, though it may recognise, the need for resource mobility and for lecturers' own retraining and redeployment. Thus, is the real danger of contraction that individuals who by nature desire excellence will begin to settle for mediocrity out of frustration (Cyert, 1978)?

Like Cyert (1977), the author has argued elsewhere (Sizer, 1979 & 1980) that there is a need to appoint high quality managers of appropriate academic standing who can overcome institutional inertia when the opportunities arise. These managers of change should not only be able to plan and control efficiently the allocation of resources to see their institutions through the short-term financial pressures, but also be able to motivate people to recognise the need for long-term change, and secure their participation in its planning and implementation. By gaining acceptance for phased withdrawal from some subject areas, they need to turn fixed costs into variable costs so as to release resources to finance new faculty and new initiatives in existing and emerging growth areas.

However, while Cyert (1977) considers management 'is our major hope for the future', he also recognises that '...academics resist being managed by expert managers and seek to have an academic in the top management position. Only rarely will this approach lead to an excellent manager' (Cyert, 1978). It may be for this reason that an anonymous Registrar of a British university (*The Times Higher Education Supplement*, 1979) has expressed the view that British universities find themselves without the apparatus for that efficient and effective deployment and management of scarce resources. He considers they are:

...hung up still on the medieval and almost superstitious fear of 'management' within universities which leaves the resource allocation

processes in many of them hardly able to stand comparison with an unsophisticated game of bingo.

This Registrar's view of the resource allocation processes in British universities gives rise to the question: Do those seeking to reduce higher education cost per student by improved use of resources without reducing the quality of educational provision, know sufficient about the processes by which resources are allocated within institutions to be sure that they will result in the improved use of resources and the resource mobility necessary for longer term effectiveness? Do the decision makers within institutions ask themselves whether their resource allocation formulae are compatible with their long term objectives and strategies? Could their resource allocation processes be dysfunctional in this respect? Do the committees that take decisions about 'frozen posts' take account of long-term strategies for resource mobility or simply concentrate on historical relative workload?

Over-emphasis on *process performance indicators* that measure short-term effectiveness and efficiency at the expense of *progress measures* might result in incentive situations which are not consistent with the institution's long-term goals and objectives, towards which the managers of change are striving. This is not to say that short-term cost efficiency is not important and process performance indicators are not relevant. It is a question of balancing short-term cost efficiency with long-term effectiveness. Certainly resource allocation processes compatible with the institution's goals and objectives may be inconsistent with the achievement of improved short-term cost efficiency. For example, the Loughborough/Lanchester project (Birch, Calvert & Sizer, 1977) would suggest that the class sizes might be increased, but the internal resource allocation processes may favour small group teaching and tutorials because it is consistent with the institution's objectives for students' academic development.

If the resource allocation processes in many universities are comparable with an *unsophisticated* game of bingo, should academic accountants, particularly those specialising in management accounting, take a greater interest in the planning, resource allocation, and performance assessment within their institutions? Should they endeavour to ensure that at least a *sophisticated* game of bingo is played?

Summary and conclusions

The changing needs of society, particularly during periods of contraction and under conditions of financial stringency, necessarily involve the development of a strategy for *resource mobility*. It has been argued that during such periods high quality managers of change of appropriate academic standing should be motivating their institutions to strive to become effective in the long-term through attempts to:

- examine systematically the future environment in which it will be operating and to identify threats and opportunities;
- understand and communicate the implications of this future environment to the institution's constituencies;
- evaluate the institution's current subject area portfolio and critical resources;
- agree through consensus building techniques the goals and objectives for the institution and its constituent parts, and the *measures for monitoring progress* towards achieving these goals and objectives;
- develop
 - (a) a set of alternative long-term strategies and operating plans including a strategy for long-term resource mobility;
 - (b) a strategy for medium-term financial mobility and short-term emergencies;
 - (c) resource allocation procedures consistent with the institution's long-term objectives; and
 - (d) a short-term planning and control system based on measurable information and performance indicators, backed up by a nationally organised scheme for inter-institutional comparisons (Sizer, 1979a).

Within this framework it has been recognised that while institutions of higher education, like other non-profit organisations, are increasingly having to account for their efficiency and effectiveness to external bodies, these are elusive concepts in higher education. The problems of agreeing objectives, identifying and measuring the component parts of the institutions, and of evaluating performance and effectiveness, suggest that only 'partial' measures of performance are possible, and that a proper balance has to be struck between qualitative and quantitative aspects. Tests of appropriateness which should be applied to those partial performance indicators have been pro-

posed. These 'partial' performance indicators provide a starting point for managerial judgements, and there is likely to remain, in the foreseeable future, a considerable gap that has to be bridged by such judgements. Nevertheless, as in other governmental and non-governmental non-profit making organisations, the wind of change is blowing through institutions of higher education. They are having to examine critically their information systems to ensure they are producing the right information, to the right people, in the right way, at the right time. To achieve positive motivation institutions of higher education are having to recognise that managers at all levels must participate in all aspects of performance assessment, hence the growing interest in institutional self-evaluation.

Thus, the greatest challenge to the managers of change is to create an environment in which members of faculty and administration, heads of departments, and senior academics and administrators, and the hierarchy of committees strive to achieve goal congruence between their objectives and actions and the long-term objectives and strategies of the institution. The performance indicators developed and employed should be consistent with these objectives and strategies. However, people not performance indicators make and implement decisions. No matter how appropriate and relevant the performance indicators, they will only be effective if the decision makers' responses and actions are positive. The 'managers of change' have to create an environment which will lead to positive responses. The provision of relevant financial and quantitative information for planning, decision making and control purposes is an essential prerequisite to creating such an environment under conditions of financial stringency, possible contraction and changing needs.

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A 1794 Ledger Demonstrates an Economic Transition

Williard E. Stone

In the late eighteenth and early nineteenth centuries the United States experienced a transition from a colonial economy to a more modern business economy. This change covered a 50 year or longer period of time and occurred at different times in various parts of the country. Beginning in the eastern states, it spread slowly through the south and finally to the midwestern states and territories. A 1794 customers ledger of Middletown, Delaware was examined for evidence of the stage of economic development enjoyed in that period by a small village in the eastern United States.

The first two thirds of the leather bound ledger contains the records for the general store, Reynolds & Clark, merchants, for the years 1794 and 1795 with some collection transactions of 1796. The last third was used for the 1799 to 1801 transactions of John Reynolds Company, a blacksmith shop.

1794 Middletown, Delaware¹

Middletown in 1794 was a village of about 3,000 people located 50 miles south of Philadelphia on the stagecoach road connecting Philadelphia, Wilmington, Middletown and Dover. It was linked by nearby Appoquinimink Creek with the Delaware Bay which offered a direct water route to Philadelphia. In addition, Middletown was 10 miles north of the village of Duck Creek which was the terminus of a major water route to Philadelphia. The economy of Middletown, Delaware was, therefore, under the influence of its close proximity to Philadelphia. In one year in the 1780s, 40,000 bushels of corn and wheat were shipped to Philadelphia from five granaries on Duck Creek.² All 'roads in Delaware in the late 18th Century led, like its rivers, to Philadelphia'.³

The accounting records of Reynolds & Clark

present evidence of strong commercial ties with Philadelphia. The general store purchased its merchandise from two Philadelphia suppliers, North & Haskens and the James Smith Market. The store acted as a purchasing agent for customers who acted as brokers for corn and wheat which was undoubtedly sold in Philadelphia. Reimbursement for these purchases was accomplished by the brokers making payment on behalf of Reynolds & Clark to North & Haskens in Philadelphia. Additional evidence of the close relationship of Middletown with Philadelphia was the frequent payment by customers using \$10 and \$20 banknotes which could only have been those of the Bank of North America, chartered 1781, or of the Bank of the United States, chartered 1791, both in Philadelphia. These notes were accepted at face value which would eliminate the possibility of their being those of the Continental Congress or the state currency of Delaware or adjoining states. In that period colonial banknotes were accepted only at material discounts from face value. These close commercial and financial ties of Middletown to the largest United States city of the period would indicate that its business operations would have entered the transition period from a colonial economy to the more modern business economy earlier than that of similar sized villages in many other parts of the country.

The colonial economy

Characteristics of the colonial economy include:

1. Business enterprise was in the hands of many small entrepreneurs with small capital accumulations at their disposal.
2. Currency to serve as a medium of exchange was in very short supply leading to the extensive use of barter.
3. Colonial accounting systems were primitive and incomplete, giving evidence of only a limited adoption of double entry book-keeping procedures.

¹See Stone (1978) for a more complete picture of this village.

²Munroe (1954), p. 35 and 36.

³Munroe (1954), p. 137.

4. Business transactions covered long periods of time from inception to final settlement and required the granting of long term credit from the supplier to the retailer who passed it along to his customers.

5. Many forms of currency were in circulation and their exchange value varied considerably among the states and from year to year.

6. There were no banks available to small villages; credit and other banking facilities were supplied by the general storekeeper.

With these characteristics in mind, let us examine the 1794 accounting records for evidence of business transactions indicative of a transition from a colonial economy to a more modern business economy.

Enterprise size

Reynolds & Clark's operating as a partnership was not uncommon for the colonial period, although it is evidence of the increasing capital accumulation required for business operations. The wide variety of domestic and imported goods sold by them bespeaks a large inventory. John Reynolds, Esq., however, as an entrepreneur, gives strong evidence of the increasing accumulation of capital and of the centring of business operations in the hands of a single man or a group of individuals. Both as an individual and as a member of an economic group, John Reynolds demonstrated an increase in enterprise size. He was an attorney, a partner in a retail merchandising business, proprietor of a blacksmith shop, and, as disclosed by transactions in the ledger, the operator of a charcoal kiln. In addition, he operated in a loose association with two other attorneys, Richard Bassett, Esq. and Edward Oldham, Esq., and a wealthy layman, John Carnan, to supply banking services in the form of loans of credit to a large number of the store's customers.

Other customers of the store were also entrepreneurs using large amounts of capital. Levi Hollingsworth operated a line of 'stage boats' between Christiana Bridge and Philadelphia⁴ and Joseph Rothwell was the owner of Rothwell's wharves on Duck Creek.⁵ The three individuals associated with Reynolds in the 'banking' also had additional business connections. Carnan operated a sawmill and was a wheat broker. Bassett and Oldham were law partners and the latter acted as a wheat and hide broker. The entry of

these men into several fields of endeavour is evidence of an expanding scale of business operations in the eastern states. This group of four wealthy men informally pooled their resources and, using the store's book-keeping system, supplied capital to many citizens of the village. This cooperative financial activity demonstrates the manner in which Middletown met the demands for an increased capital accumulation.

The economic activity of these Yankee traders signified a change from the more limited economic activities of the business man of the colonial period to the more extensive business activities of the later business entrepreneur.

Book-keeping barter

The blacksmith shop was operated almost entirely without barter. The only barter transactions appearing from 1799 to 1801 involved scrap iron and hides, both products which were of use in the trade. The general store accepted payment in kind for their goods and services. There was, however, strong evidence that book-keeping barter was approaching the end of its long reign. Not only was a significant majority of customers' payments received in cash, but the nature of the barter which continued was changing. In only relatively few instances were common barter items, such as eggs, poultry, butter and other small farm products, received. Neither was the general store used for commodity swapping. In the 1832 bartering of a cobbler in a small inland Virginia village,⁶ knives, watches, guns, books and other household items were commonly accepted as payment and later sold to other customers. This type of barter was entirely missing from the Middletown ledger.

The majority of the value of barter items received was for corn, wheat and hides which were collected by the store for brokers of those commodities. Although the book-keeping type of barter through transfers of charges and credits the Reynolds & Clark ledger, true barter was greatly reduced. Clearly the transactions recorded in the Reynolds & Clark ledger foretell the passing of the colonial barter system.

The accounting system

The store ledger containing customers' and a few vendors' accounts was designated with the let-

⁴Scharf (1888), Vol. II, p. 941.

⁵Conrad (1908), Vol. II, p. 615.

⁶Stone (1974).

ter B. It had been started on January 1, 1794 with balances brought over from ledger A, perhaps indicating that the Reynolds & Clark partnership had begun 2 years before. Transfer entries at various dates early in 1796 specified a carryover to ledger C showing that ledger B was in use for just over a 2 year period. The blacksmith's ledger had characteristics similar to the store ledger and was in the same handwriting. A division of book-keeping duties appears to have been in use. The ledgers were posted, probably by John Reynolds, from day books maintained by Alexander Clark for the store and by the blacksmith, who, appropriately, was named David Smyth. It seems to have been very usual for the entrepreneurs of the colonial period to act as their own book-keepers. Both Washington and Jefferson kept their personal accounts even during their terms as president of the United States.

There is evidence that the books were kept with care and were periodically audited, probably by John Reynolds. Errors in posting from the day book were discovered and corrected, sometimes after a considerable period of time. One such correction, dated January 21, 1795, covered the omission of the charge for a purchase dated June 1794 in the day book. The uniform beginning of the store ledger on January 1, 1794 was, perhaps, an indication that the period concept was being introduced. The overlap of entries from daybook C in the beginning of 1796 and the transfer of balances at various dates, however, preclude the conclusion that a biennial period was fully in use, but the period concept was obviously evolving.

The book-keeping system, comprising a day book and a ledger, was typical of the colonial period. It contained some features of the double entry method such as the label 'debit' for the charge side of customers' accounts and the prefixes 'to' for debit and 'by' for credit transactions. It was, nevertheless, an incomplete system. The ledger contained only accounts for customers and a few vendors and no attempt was made to account for other assets and liabilities. John Reynolds, the owner, had an account but it was similar to a customer's account and did not disclose his complete owner's equity. No recordings were made of revenues or expenses. While a quite simple system, it apparently was successful in recording surprisingly complicated transactions involving many transfers of account balances, charging of credit purchases by one customer to the account of another, and payments by cash, notes or barter by one customer for the account of another.

Store transactions with Reynolds, Bassett, Oldham and Carnan were particularly complicated. Credit purchases by 69 different individuals were debited to their accounts indicating a granting of credit privileges to them. On occasion these individuals made payments to the store which were entered on the credit side of the credit guarantor's account. Additional transactions in the accounts of Oldham, Carnan and another customer, Joseph Israel, who acted as a corn broker, recorded debits for purchases of substantial amounts of wheat, corn and hides. As a result of these transactions and the credit transfers to other customers, large balances were built up in their accounts. Settlement was usually made by Carnan, Bassett, Oldham and Israel making payment in Philadelphia to North & Haskins and the James Smith Market for the account of Reynolds & Clark.

Transfers of large sums were also made from one of the four financiers to the other. For example, John Carnan's account was debited with the entry 'to Rich^d Bassett £85 12s 7d.' and Bassett's account credited under the same date 'by cash from John Carnan £85 12s 7d'. Perhaps the 'cash' fiction may have been helpful to John Reynolds in recording these complicated transactions. The involved nature of these business transactions was obviously placing a great burden on the book-keeper's ingenuity. Improvements in an accounting system generally occur as a response to the demands made upon it. Although the Reynolds & Clark ledger was still typical of a simple colonial book-keeping system, there was every indication that the system had lagged behind the economy and that the change to a more complete double entry system would soon be required.

Changing credit terms

Colonial retailers obtained long term credit from their suppliers and passed the credit received along to their customers. Atherton states that colonial merchants 'granted a full year credit on goods sold in January and this frequently meant 14 or 15 months since crop returns might not be available in less time'.⁷ About the turn of the century terms of credit began to change. Roy A. Foulke quotes T. M. Harris, who surveyed credit customs of Philadelphia and Baltimore wholesalers about 1800. Harris found that credit terms to merchants were generally 9-12 months and that

⁷Atherton (1949), p. 120.

the merchants in return gave their customers from 6 to 18 months. Foulke also quotes a study made in 1817 by Henry B. Fearon, an Englishman touring the United States on behalf of a British group looking for investment opportunities. He found that Cincinnati merchants received 6-7 months credit in Philadelphia but seldom paid within that period and were charged 7% interest.⁸

The reduction of credit terms offered to western retailers by Philadelphia suppliers from 1 year to 6 months would thus appear to have taken place between 1800 and 1820. The accounts of Reynolds & Clark disclose that this change had taken place earlier in Middletown, Delaware. The account balance due to North & Haskens on January 1, 1794 was £450. When the next purchase was made on April 7th, £385 was paid and the balance was settled on May 23. A substantial portion of an order of April 7th was paid for by September 15th. An order for merchandise costing £441 from James Smith Market also on April 7, 1894 was accompanied by a £150 cash payment. An additional £100 payment was made on May 23. These transactions indicate credit terms of less than 6 months. The Reynolds & Clark records give every indication of the company being in sound financial condition and John Reynolds was certainly a man of affluence in his community. The less than 6 months credit terms granted Reynolds & Clark would seem to be a change in the general credit policy of the supplier rather than a reflection on the credit standing of the company.

The majority of the customers of the general store paid their bills within a 6 months period. A few customers who had balances outstanding for longer periods were charged 6 months interest at 6% per annum. It is significant that interest was always charged at 6 months intervals. Reynolds & Clark were not more liberal in their credit terms to their customers than their suppliers were with them. Two customers who did not settle their accounts for longer periods were required to give bond; at the end of 9 months in one case and 12 months in the other. The long term credit policies of the earlier colonial period seem to have been effectively shortened by 1794 in Middletown, Delaware.

Currency usage

The volume and frequency of payments in cash by the store's customers is evidence that the sup-

ply of currency had increased by 1794 in Middletown. This corroborates the surprising expansion of the US monetary supply. It is estimated that there was in circulation in 1790 \$3.00 per capita of US and foreign banknotes of all types. By 1795 this figure had increased to \$7.77; a per capita total that was not surpassed until 1811.⁹ This increase in the supply of currency appears to have affected the economy of Middletown at a very early date.

The Reynolds & Clark ledger was maintained in British pounds sterling, indicating that the customers preferred to have the merchandise priced in these terms. Even the computation of interest on notes and overdue balances was in British currency and the maturity value of notes was uniformly expressed in British currency. Money collected was converted to pounds, shillings and pence at an exchange rate of 7s. 6d. per US \$1. From the conversion rate it was possible to determine that almost all large payments were received in US \$10 and \$20 denominations. Small receipts usually converted to fractions of pence that could not be equated to the US dollar, indicating that most silver and copper coinage in circulation was of foreign origin.

Although the Congress on July 6, 1785 formally adopted the decimal system and the dollar as the standard for currency among the states, it was many years before the other types of coinage disappeared from circulation. Congress adopted the mint ordinance on October 16, 1786 and prohibited the circulation of foreign coinage (except gold) after September 1787.¹⁰ The mint was established in 1793 but by 1795 only \$382,055 US coins had been produced.¹¹

Dollars (silver)	\$204,791
Half-dollars (silver)	161,572
Half-dimes (silver)	4,320
Cents (copper)	10,660
Half-cents (copper)	712

This supply proved to be inadequate and Congress extended the deadline time and again for the removal of foreign coins from circulation. On February 21, 1857 Congress finally outlawed all foreign coins except Spanish-American silver pieces.¹²

Although the accounting records of Reynolds & Clark give evidence of the continued use of foreign coinage in 1794 and 1795, a marked im-

⁹Hepburn (1915), p. 86.

¹⁰Carothers (1930), p. 52.

¹¹Carothers (1930), p. 316.

¹²Hepburn (1915), p. 48.

⁸Foulke (1941), p. 112.

provement in the currency situation had occurred. As mentioned earlier, the uniform acceptance of banknotes at par indicates that the disrupting influence of weak Continental and state paper currency had been overcome. The Reynolds & Clark ledger thus bears out the success of Hamilton's programme in placing the US monetary system on a firm footing in a remarkably short period of time. The large volume of payments with \$10 and \$20 bills gave evidence of the widening circulation and acceptance of the new banknotes of the Bank of North America and the Bank of the United States. It needed only adequate coinage of US copper, silver and gold coins to rescue the United States from the unsatisfactory currency situation of the colonial period.

Emergence of banking

Colonial America had no banks. This was in part due to the excellent job of the merchants in making credit available and in part because of the influence of English bankers upon British law enforced in the Colonies. In 1740 John Colman of Boston, using land as security, had issued bills of credit which were circulated as money. Governor Jonathan Belcher in 1740 warned Parliament that these 'land banks if not stopped would result in more fatal consequences than the South Sea Bubble'. Parliament thereupon extended the South Sea Bubble Act to the Colonies in 1741, suppressing 'mischievous and Dangerous undertakings'.¹³ In 1764 Parliament further passed an act 'to prevent Paper Bills of Credit, hereafter to be issued in any of His Majesty's Colonies or Plantations in America, from being declared to be a legal Tender in Payment of Money'.¹⁴ These hampering restrictions upon the banking and commerce of the colonies have been cited as a major cause of the dissatisfaction which led to the Revolutionary War.

At any rate, no banks existed in the Colonies until the Bank of North America was chartered in 1781. Banking functions, for the most part, were carried out by the general stores. Reynolds & Clark were heavily involved in supplying their community with necessary banking functions. Reynolds, Bassett, Oldham and Carnan used the store's accounting system to supply 69 individuals with credit loans totalling over £2,100 during the period 1794-1795. There can be little doubt that these men knew the nature of the services they

were performing. Bassett became a charter applicant for the first bank in Smyrna, Delaware. In 1796 he signed the petition for incorporation of the Bank of Delaware which received a charter on February 9, 1796 and began business in Smyrna with capital of \$500,000.¹⁵ This bank was preceded in Delaware only by the 1790 branch of the Bank of Maryland, the 1792 branch of the Bank of the United States and the 1795 Bank of Baltimore, all in the city of Baltimore. It was therefore the first Delaware establishment that could be called a country bank.

In addition to supplying credit loans, Reynolds & Clark performed other banking functions. The store acted as a depository for some customers whose accounts carried credit balances for short periods after turning over their corn and wheat crops. Many times loans of cash were charged to customers' accounts. During the period March 1794 to March 1795 seven customers gave drafts or notes totalling £326 4s. 10d. to the store in return for cash. The makers of these drafts and notes were not customers. One draft was for £22 10s. drawn on a Mr. Bunkers. The transaction was run through the account of a customer, Edward Black, who received £20 3s. for the draft and was thus charged a discount fee of 10%.

Conclusions

By 1794 the US economy had recovered from the worst effects of the Revolutionary War. The price level had stabilised; the Reynolds & Clark ledger disclosed very few commodity price changes for the years 1794 and 1795 that could not be explained by variations in quality. The currency problems of the Colonial period were well along towards a solution. A more adequate supply of currency was available and the quality was improved. Continental paper currency had disappeared and the new US banknotes were accepted at par. A confusing variety of gold, silver and copper coinage persisted but the fluctuations in exchange rates had settled down. There existed a favourable climate for economic change and growth.

The 1794-1796 Middletown ledger discloses evidence of an economy in a transitional stage in many respects. Evidence of an increasing accumulation of wealth, both in the hands of individuals and through individuals pooling their resources, foretells the change in business enterprise scale which characterised the emerging business econ-

¹³Hammond (1957), p. 15.

¹⁴Hammond (1957), p. 26.

¹⁵Munroe (1954), p. 146.



omy. There was a change taking place in both the amount and nature of barter. It would seem that the general store and blacksmith shop of Middletown and environs were typical of the eastern seaboard towns and villages with respect to the practice of barter. From the records of these two establishments, it is clear that true barter between customer and business organisations was on the wane.

The lengthy credit terms of the Colonial period appear to have been rapidly approaching the 30–60 day terms which characterised United States business in the later 1800s. The average credit received by the store and granted to its customers was for a term of about 6 months with notes and bonds required for those accounts which were unpaid from 9 to 12 months. There are also many indications in the records of the effects of the increasing supply of sound currency. The frequency of payments received in cash, the acceptance of United States banknotes at par and the use of a constant exchange rate are all indications of a much improved monetary system.

The records also foretell the creation of the country banking system which was soon to come. Colonial merchants performed a lending function for their customers but Reynolds & Clark went much further in supplying many banking functions for Middletown. The store's book-keeping system acted as a credit clearinghouse for the four wealthy individuals who supplied a large number of the customers of the store with credit loans. The acceptance of drafts and notes drawn on non-customers for the convenience of the store's customers went beyond the usual providing of credit by the merchant. The complicated credit transactions of the Reynolds & Clark store gave it many characteristics of a bank. It is quite evident that country banking was on the point of emerging on the eastern seacoast of the United States in 1794.

Although the accounting system itself was still 'Colonial', the economic pressures which would bring about the change to the full double entry

system were clearly present. The stage was set for abandoning the keeping of records in British pounds, shillings, and pence and for the change to the decimal system with US dollars and cents. The complicated financial transactions being recorded clearly placed a strain upon the incomplete colonial system of book-keeping in use and indicated the need for a complete double entry system. As has been demonstrated so often in the past, developments in accounting systems take place because of a favourable basis (the decimal system of currency) and a strong economic demand for the change.

The close agreement of the nature of the transactions of the 1794 ledger of Reynolds & Clark with the well known history of the USA of that period appears to be evident. It could perhaps lead to the conclusion that had the actual economic history not been known, it could have been reconstructed from accounting records of the period. The possibility also exists that more extensive analysis of early accounting records may bring about corrections of historical inaccuracies which may have crept into the record.

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A Tower of Babel?

Geoffrey Whittington

Once upon a time, all the world spoke a single language and used the same words. . . . 'Come', they said, 'let us build ourselves a city and a tower with its top in the heavens, and make a name for ourselves; or we shall be dispersed all over the earth.' Then the Lord came down to see the city and tower which mortal men had built, and he said, 'Here they are, one people with a single language, and now they have started to do this; henceforward nothing they have a mind to do will be beyond their reach. Come, let us go down and confuse their speech, so that they will not understand what they say to one another.' So the Lord dispersed them from there all over the earth, and they left off building the city. That is why it is called Babel. . . .

Genesis 11, 1-9
The New English Bible

In May 1978, Professor Sterling organised a symposium on Accounting for a Simplified Firm Owning Depreciable Assets. Seventeen essays, by twenty-three contributors, were commissioned, each purporting to deal with the problem of accounting for a taxi company which owns depreciable assets (taxicabs) but otherwise conducts all of its transactions in cash. The purpose of the case was 'to focus tightly on the valuation and depreciation of the capital good' in the hope that concentration on a simplified case and a bounded problem would lead to two possible outcomes: (1) agreement on a core theory or (2) better understanding of the bases of our disagreements. The papers are now published¹ with a concluding synthesis by Ross Skinner.

The result is undoubtedly, and almost inevitably, a book which will command a wide readership. It affords the almost irresistible opportunity of reading the latest thoughts of such scholars as Thomas, Ijiri, Bell, Chambers and Mattessich (in order of appearance, not necessarily of importance), in a concise and readable form, and focussed upon a clear and simple problem. It is therefore ideal material for students of accounting theory. However, its purpose is more serious than the provision of a high-level set of student readings, and it deserves to be evaluated in terms of its ambitious objectives: agreement on a core theory

or better understanding of the bases of our disagreements. Clearly, the first of these is extremely ambitious and it has not been achieved. The second is a more realistic objective and has been achieved to some extent: it could be argued that this is a necessary step towards achievement of the first.

The initial impact of the book does not suggest that it will even produce agreement on the basis of disagreement. The first contribution is a characteristically elegant and incisive critique of allocation-based accounting by Arthur L. Thomas, but the fourth, which is also classified under 'Cash Flows', is a paper by Dyckman advocating economic depreciation as a means of allocating the cost of the fixed assets, which makes no attempt to reply to Thomas' critique and, indeed, makes no reference to his work. Subsequent parts of the book are classified as dealing with Entry Values, Exit Values, Historical Costs, and Mixed Valuations, and within each of these parts also there is considerable variety of viewpoint. For example, under Exit Values, we find Professor Chambers arguing with characteristic single-mindedness for a CoCoA solution whereas Collins and Mock, approaching the reporting problem from the perspective of measurement theory, adopt an essentially eclectic approach which does not require articulated accounts and which does not require strict adherence to exit values (both of which are, of course, characteristics of CoCoA). The techniques used also vary widely: for example, the Mixed Valuations section starts with Carsberg, who uses mathematical programming, followed by Mosich and Vasarhelyi who use a matrix reporting model, Boatsman and Hite whose paper is based on the single-period capital asset pricing model, and Mattessich who confines his attention to the assumptions of accounting theory. The result may be likened to the biblical Tower of Babel, which could not be completed because the builders spoke different languages and could not understand one another.

However, this impression is superficial. Despite the differences in language and technique of argu-

¹ *Accounting for a Simplified Firm Owning Depreciable Assets. Seventeen Essays and a Synthesis Based on a Common Cause.* Robert R. Sterling and Arthur L. Thomas (eds), Scholars Book Co., Houston, 1979. ix + 359 pp.

ment and in the form of the reports which are preferred by different authors, considerable common ground emerges. Some of this is described in Skinner's synthesis paper, although he was given an impossible task in being asked to synthesise seventeen diverse papers and the discussion (which is not reported) in twenty-four pages. The commonly shared view, expressed by all but three authors and implicitly by these, is that accounting is teleological or purpose-oriented. This gives rise to the possibility that different types of information may be needed for different purposes and that accounting reports should be eclectic in the valuation bases and range of information which they embrace. The latter view is widely expressed, two notable exceptions being Chambers and Ijiri,² although they do not express positive dissent, merely preferring to concentrate on the properties of their own particular solutions, in accordance with their brief. Most writers concentrate on reporting to the investor, and the most commonly assumed objective is to enable the prediction of future cash flows and the assessment of the 'economic substance' of the business, as suggested by the Trueblood Committee and subsequently adopted by the Financial Accounting Standards Board.³ In pursuing this objective, there seems to be implicit or explicit agreement amongst the contributors that it is not possible objectively to measure a concept of economic income or value which will serve as a 'true' measure of performance or worth; the emphasis is rather on providing relevant information which will help the user to make his own subjective assessment of these matters. On specific techniques, many (but not all) of the contributors recognise the allocation problem as raising serious difficulties for reporting systems based on matching and there is a significant minority support for deprival value (or what Stamp, in his contribution, prefers to describe as opportunity value), the most notable convert being Bell (formerly of Edwards and Bell, and here in partnership with Johnson). There is also considerable support for funds statements or similar analyses of liquidity changes amongst those who do not choose a full-blooded cash flow solution to the reporting problem. Thus, there is a much greater consensus than appears at a superficial inspection.

The superficial appearance of a Tower of Babel can be blamed partly upon the structure of the symposium. There were too many contributors for an obvious consensus to emerge. This has had the further effect of creating a book of unwieldy length, affording little space for the important final synthesis and none at all for the discussion.⁴ It may also have had an inhibiting effect on the individual contributors, causing them to concentrate on their own solutions to the exclusion of discussing the relative merits of alternatives: it is notable that the only paper which attempts a comparative evaluation of competing models, that by Bell and Johnson, is the longest in the book. Furthermore, the large number of papers has led to their being classified into the arbitrary sections described earlier, with the result that there is as much variation within sections as between them: for example, both Stamp and Carsberg advocate opportunity value, but the former is classified under Entry Values and the latter under Mixed Valuations.

There is, however, a more fundamental problem of the exercise, which is at the root of the apparent diversity of the results, namely that a brief given to the contributors specified a simplified *firm* but did not simplify the nature of the reporting *problem* by, for example, specifying a particular use or a particular type of user. If an instrumental view of accounting is adopted (as it is by the contributors) it is the latter type of simplification rather than the former which is necessary to lend cohesion to the total exercise. In its absence, the contributors make different assumptions about the purposes which they are considering, the assumed users, and the decision processes of those users (e.g. whether they are 'functionally fixated'), with the result that the favoured systems show more variety than would be justified merely by differences in the theoretical frameworks of the various contributors. The simplified taxicab company has the virtue of providing relatively simple numerical examples, but it is not clear that there is a corresponding gain in conceptual simplification to be obtained by assuming a single depreciating type of asset, rather than including monetary assets and stocks. The problems of asset valuation and income measurement or its cash flow alternatives still have to be faced when we have only one class of asset. Thus Sterling's hope that simplified *cases* will lead to the identification of a common 'core theory' of accounting is un-

²Chambers and Ijiri are two of the three 'survivors' from Sterling's previous symposium, Sterling (1971), the other being Bell.

³21 of the 25 contributors to the book are currently based in North America.

⁴This makes an interesting contrast with Sterling's previous venture of this type (Sterling, 1971), which contained half as many papers but much more discussion and interaction.

likely to be fulfilled. This point is made forcefully by Mattessich and in a more muted form by a number of other contributors to the book.

Thus, a second analogy with the Tower of Babel is appropriate. To the modern mind, the surprising feature of the story is not that the builders spoke different languages and so failed to co-operate, but that they ever thought that they could build a tower 'with its top in the heavens'. Modern skyscrapers have more limited aims, but there are more of them and they do operate effectively. It may also be true that we should abandon the idea of a defining single set of accounts as a universal panacea and concentrate on the identification of a variety of more modest blocks of information which will usefully serve specific purposes. The case for this type of approach is put most clearly and unpretentiously in Stamp's contribution to the book.

Here we come to a second basic weakness of the exercise. Once we recognise the need for a variety of information, we face the problems of trading off relevance against reliability, cost against benefit, and, possibly, the interests of one class of user against those of another. Multi-purpose reports are essentially based upon a compromise between such competing claims, in a world in which cost considerations preclude the provision of tailor-made reports to the individual user. If such issues are to be resolved we must have resort to empirical research, in order to quantify the environmental constraints. There is no empirical research in this book and most of the argument is purely of the *a priori* deductive variety, although some contributors, such as Boatsman and Hite, do make commendable use of the empirical work of others in framing their assumptions. A minority of contributors also propose schemes for research, which would be largely empirical in content, but such schemes are mainly of the 'grand design' type and give little indication of how the author would set about implementing the research and no indication whatsoever that he has any serious intention of carrying it out. This is unfortunate, because there are a number of important and relatively simple empirical issues crying out to be tested. For example, Stamp advocates multi-column reporting whereas Chambers prefers to confine his reports to exit value, in his CoCoA system. A central reason for this, which is apparent in earlier exchanges between these authors (Stamp 1972, and Chambers 1972) is that Chambers believes in 'information overload', the confusion created in the mind of the user by receiving too much information. There is little

empirical evidence concerning the existence or extent of this phenomenon, apart from oblique evidence from efficient market studies (an efficient market discounts *all* information efficiently, and does not, therefore, suffer from overload), yet no proposal for research into the subject is made in this book.

The neglect of empirical research is regrettable from a wider perspective. There seems to be a trend, more sociological than logical, for accounting researchers to split into two groups: 'theorists' and 'empirical' researchers. Since the theorists are attempting to analyse problems which arise from the real (i.e. empirically observable) world, and since orderly empirical observation is impossible without some form of theory, *a priori* theory and empirical observation are essentially complementary: this point is made in the context of accounting by Buckley, in his contribution to the Sterling and Thomas volume, and, in the related area of economics, by Stone (1966). Certainly it is a central characteristic of the natural sciences that theory and experiment are complementary activities, and Sterling, in his introduction, seems to cherish the ambition that accounting should imitate the methods of the natural sciences. It is therefore surprising that he has not guided his contributors into closer alignment with empirical research.

Apart from these broad reservations about the structure of the symposium, there are, inevitably, a number of points in the individual papers where the reader will not agree with the authors' reasoning on logical, as well as on empirical grounds. In many cases, these points of difficulty may be the result of cramped exposition, imposed by the limited space available. One example is Chambers' proposal (pp. 189-195) for a DCEF (Discounted Cash Equivalent Flow) method of investment appraisal. 'Cash Equivalent Flows' are not *flows* unless they are realised as cash: regarding a stream of realisable *values* (cash equivalents) as flows, runs the danger of double counting, unless a deduction is made from each realised value to allow for the investment necessary to obtain the next such value, i.e. unless the 'cash equivalent' is reduced to the *realised* cash flow. This would leave us with traditional DCF and DCEF seems to be an unnecessary complication. However, Chambers goes further than this and seems to claim (p. 191) that the deduction for reinvestment should be made at the end of the following period, not at the point when the cash equivalent is recognised, because 'it is usual to assume that receipts and outlays occur at the ends

of periods to avoid further assumptions about their distributions through any year.' This is a purely pragmatic argument, not living up to the high standards of theoretical consistency which would normally be expected of this author.

Other contentious points of a similar type include Anderson's claim (pp. 157-8) that prices in capital markets have been shown to be 'unbiased estimations of a security's *intrinsic value*.' Weston (p. 242) needs to explain and justify his concept of cost when he says: 'The use of historical cost—adjusted for general price level changes—to measure the cost side of the exchange transaction is the best approach because *it truly compares the cost of what has been sold with the proceeds of the sale*.' Carsberg's confident statement that 'the present value of future cash flows will normally be greater in aggregate than the deprival value of assets' (p. 294) requires qualification in the light of the allocation problem which is involved in calculating the present value (a component of deprival value) of individual assets. Mosich and Vasarhelyi (p. 312) state *ex cathedra* that: 'Exit-value valuation is meaningless in situations where 'exit' is not intended or possible.' This does less than justice to the arguments accumulated by Chambers in this volume and elsewhere, which surely deserve a rational reply, and the case in which 'exit' is 'not possible' is surely dealt with adequately by recording a zero exit value. Boatsman and Hite (p. 331) seem to draw a much stronger inference than their analysis will bear when they claim that *ex post* depreciation measures must predict future depreciation adjusted for risk. Surely, a prediction of the expected value of future depreciation would be much more useful than nothing, even if believers in the capital asset pricing model would find a prediction of the certainty equivalent (i.e. future depreciation adjusted for risk) even more useful.

This catalogue could be extended, but the more contentious points have been listed, and these should serve to indicate that there is considerable scope for disagreement with a number of the arguments advanced in the individual papers.

However, this is no more than is to be expected, or even hoped for, in a book which aims to stimulate further thought. The book is, incidentally, remarkably free (but not exempt) from errors of a grosser and less contentious type, such as misprints.

In summary, Sterling's original concept was highly ambitious and possibly misconceived. However, the Tower of Babel was also misconceived and the same has been said of the pyramids, but the pyramids have since proved to be a great asset as a tourist attraction, as, no doubt, would the Tower of Babel, had it survived. Equally, the Sterling and Thomas volume may serve a valuable, if less exalted purpose, by providing an accessible collection of readings, some of which are good summaries of the state of the art, as observed by some of its more distinguished practitioners, and others of which may point the way to future developments. The lingering doubt is as to whether it is really more of a monument to the past days of grand theory than a portent of future developments. Perhaps the time has come to stop thinking in terms of grand designs but to work instead on more limited but functional projects. Keynes once wrote: 'If economists could manage to get themselves thought of as humble, competent people, on a level with dentists, that would be splendid!' (Keynes, 1931, p. 373). Perhaps accounting theorists should also aspire to such a status.

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Book Reviews

International Survey of Accounting Principles and Reporting Practices. R. D. Fitzgerald, A. D. Stickler and T. R. Watts (eds). Butterworths, 1980. 190 pp. £5.30.

This is the third Survey of accounting principles and reporting practices by Price Waterhouse. Previous Surveys have been published by Price Waterhouse and the Institute of Chartered Accountants in England and Wales. There is also a penta-lingual version of the 1980 Survey.

Just as the 1975 Survey was larger than that of 1973, so the 1980 Survey again increases the number of 'practices' and countries, this time to 267 and 64, respectively. Also very greatly expanded are the explanation of survey methods and suggestions to assist understanding. Provision of this information is vital for sensible interpretation. For example, there is a useful new distinction between a practice which is 'required' by law or professional body, as opposed to 'insisted upon' by practising accountants. The terms are well explained.

It is clear that a great deal of effort has been expended to collect, check and clarify the information. For practising accountants moving round the world or dealing with foreign subsidiaries, for international bankers, and for academics interested in comparative accounting, this may be a very valuable source of information. However, some of the information might be highly misleading if taken at its face value or if thrown untouched into a computer in order to try to classify reporting systems by country.¹ Some examples of this problem follow.

Let us consider consolidation. In France, consolidated statements are said to be 'required' (Practice No. 209) (the strongest option available in the Survey, suggesting universal practice). However, in fact only 289 companies in 1978 and 305 companies in 1979 produced such statements (see Annual Reports of COB). This is a minority of listed companies, let alone public companies which the Survey is said to cover. The reason given in the Survey is that the *Commission des Opérations de Bourse* calls for consolidation. This is seriously misleading compared to Germany, the UK or the USA. Furthermore, many consolida-

tion practices of many countries are called 'required' or 'not permitted' on the basis of IAS 3. This is very unconvincing.

The IAS problem extends further than consolidation. In France, for example, IASC standards are said to be 'deemed mandatory' (p. 8). This is despite the fact that many of them are against tax law, commercial code or established practice. Similarly, depreciation is said to be 'required' to be 'systematic and rational' in France because of IAS 4 (Practice No. 55); yet we know that depreciation in French financial statements must almost invariably be the same as that in the tax accounts following tax rules, even if this includes accelerated depreciation (Practice No. 66 confirms this). There are many further examples of this.

As such misleading entries exist about the 'practices' in France, based on the pronouncements of far-from-mandatory bodies, I am worried about the reliability of the entries for practices in other countries about which I know nothing. Nevertheless, given due attention to interpretation this Survey could be very useful; it certainly has no direct competition.

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Elements of Operational Research. F. M. Wilkes. McGraw-Hill, 1980. xv + 343 pp. £7.95.

A-Z of Business Mathematics. W. B. Wilton rev. J. C. R. Hewgill. William Heinemann in association with Institute of Cost and Management Accountants. xiv + 176 pp. £4.95.

Dr. Wilkes believes that basic Operational Research techniques may be understood and applied with much less difficulty than is usually thought. His approach is to quote formulae and procedures relevant in common OR applications, but to avoid theoretical discussion and lengthy proofs. Since the book is principally aimed at those studying for professional examinations, this emphasis on using rather than deriving OR methods is probably well directed. The topics covered are those which have cropped up in professional examinations in recent years, but with the omission of techniques involving decision trees. Most space is given to linear programming, critical path analysis, stock control and forecasting methods. Each chapter is supplemented

¹e.g. R. C. da Costa, J. C. Bourgeois and W. M. Lawson, 'A classification of international accounting practices', *International Journal of Accounting*, Spring 1978.

by a wide range of exercises, many drawn from past professional examinations. Well-drafted solutions, explaining the main steps in the calculations, are supplied; the book will therefore prove a boon to students working on their own.

The advantages of the author's approach, and its shortcomings, are illustrated by his discussion of linear programming. This is introduced by a clear exposition of the steps involved in formulating programming problems and their graphical solution, but then the reader becomes bogged down in a description of the 'simplex' method of solving programming problems, presented as a technique to be learnt by rote. Readers will probably be wasting their time attempting to learn the simplex method unless they have a good grounding in the theory underlying linear programming. For practical purposes, problems are likely to be too complicated to permit straightforward use of the simplex method, while the questions posed in professional examinations may almost invariably be solved graphically, if necessary by transforming to the dual problem (a procedure which Wilkes mentions but does not explain).

But this book, despite occasional lapses, is a welcome addition to the range of OR text-books. It should find a place not only on the reading lists of professional students but also on those of university students taking courses in management mathematics, as a supplement to more rigorous texts. It is a pity that the publishers could not have set the price somewhat lower.

A-Z of Business Mathematics is a dictionary of terms which managers may come across in studying reports of a mathematical nature. The authors' intention is to demystify business mathematics, and within the areas on which they concentrate they succeed. Matters discussed range from set theory, through calculus and probability, to OR and computer terminology. Cross-references to linked topics are a feature of this book, and an excellent index makes location of topics straightforward. A book of this nature could easily have been confusing, or worse, dull, but Wilton and Hewgill have managed to keep their explanations rigorous without losing clarity. Flashes of humour abound: the Fibonacci Series, for example, is described as exhibiting 'a rate of growth which approximates closely to certain breeding rates, e.g. rabbits and bureaucrats.' This book will be illuminating reading to managers and others mystified by the 'numbers game'.

London School of
Economics

Christopher J. Napier

Financial Reporting for Non-Profit Organizations.
Canadian Institute of Chartered Accountants, 1980.
168 pp. Can \$19.50

This book is one of a series of Research Studies commissioned by the Canadian Institute of Chartered Accountants' (CICA) Research Department. The report recognises that non-profit organisations come in a variety of sizes which range from small local organisations to large national and world-wide enterprises. Such enterprises are deemed to be 'formed for social, educational or philanthropic purposes carrying on activities for the benefit of either their members or the public'. The study group suggests reporting standards that CICA should recommend for all non-profit organisations and also identifies areas for further research. In so doing it recognises that such enterprises are in many diverse industries and that, in determining appropriate reporting standards for non-profit organisations, the emphasis should be placed on the circumstances and the nature of the transactions, rather than the type of organisation so that similar transactions can be accounted for in the same way be all organisations.

The book comprises fifteen chapters, four appendices, a glossary of terms and a fairly comprehensive bibliography. Chapter 1 outlines the scope of the study and summarises the conclusions. Chapter 2 considers the users of financial statements and the information required. The same basic purpose is taken for both profit and non-profit organisations: 'to provide users with the information they need to make decisions'. The decision criteria are, for non-profit organisations, to evaluate the effectiveness of the management of resources in achieving the objectives and goals of a particular enterprise and to supply information to future activities. The next two chapters consider the relevant financial statements and complementary information required by non-profit organisations.

Chapter 5 follows up the idea of providing information on future activities with a discussion of the publication of budget information. The authors suggest that reported information should include the budget for the current year, as originally approved, and the budget for the following year (future budget). The former provides a comparison with actual results; the latter explains in financial terms an enterprise's plan for the following year. The publication of a future budget was generally regarded as having little effect on the competitive position of a non-profit organisation. In the following chapter, the group opt for the

accrual rather than the cash basis of accounting for transaction records. Their prime justification would appear to be that financial reports on the accruals basis avoid the possibility of manipulation by the timing of cash receipts and disbursements and the arbitrary recognition of expenses and revenues. Chapter 7 discusses fund accounting, and chapter 8 functional accounting. In chapter 9 the authors suggest that non-profit organisations should produce consolidated statements when they control one or more enterprises through a parent-subsidiary relationship. For other less certain relationships 'sufficient' financial disclosure should be made. Chapter 10 considers that it may be more useful to produce condensed financial statements providing that such presentation is relevant and not misleading; and that a complete set of audited financial statements should be available upon request.

The next chapter examines accounting for funds, whilst chapter 12 considers fixed assets and depreciation. The majority of the members of the study group believe that depreciation need not always be recorded, one view being that assets are often purchased out of donations rather than savings from revenue and that future donations will facilitate replacement.

Some members did, however, feel that depreciation should be provided, taking the view that depreciation is an element of cost that should be included in a statement of changes in financial position, being part of operational stewardship and showing the consumption of all assets used in the operation of the entity. Chapter 13 deals with pledges and grants, donated services, materials and facilities.

Chapter 14 is concerned with the auditing of non-profit organisations. The study group thought that auditing standards should be no different from those applied to profit-orientated enterprises. The notion of a value for money audit is briefly discussed and highlighted as an area requiring further research. The last chapter presents a dissenting view of a member of the study group who favoured cash flow accounting and summarises resulting differences with the main body of the report.

This is a useful report which should provide a starting reference to accounting academics wishing to become interested in non-profit organisations. Most of the topics are not discussed in depth but various basic differences between the requirements of profit and non-profit organisations are highlighted and, as previously stated, there is a useful bibliography. It is well written,

concise and a worthy addition to previous CICA studies.

University of Exeter

J. J. Glynn

A Bibliography of Business and Economic Forecasting. Robert Fildes with David Dews and Syd Howell. Gower Press, 1981. vi + 424 pp. £25.

This book is a comprehensive bibliography of journal articles and books published during the period 1971-78 on forecasting. Major items from earlier periods are also included. The book is thus over two years out of date even on publication in March 1981. Although updates are expected in each of the next two years they will merely help prevent the lag from becoming even longer and not shorten it.

The entries are completely uncritical and merely include the normal publication details and a short list of key-words. The bibliography is indexed by these key words, which form a simple and coherent structure that is quite easy to follow. On the whole the subdivision of system of reference is sufficiently small, but in some cases, such as 115 entries on the 'effect of advertising', some further subdivision might have been helpful.

The references themselves are facsimiles to computer print-out which leads immediately to the question of whether a book-based system of bibliography is the appropriate medium for such a rapidly growing subject as forecasting. A computer-based system which can be continually updated would seem more appropriate for users, who are normally going to be employing computers in their forecasting work anyway. Other such systems have come into widespread use in recent years, and usually have the advantage of a two-stage procedure of reference. In the first stage only the references are shown, but then abstracts can be obtained for any item which appears of interest.

While this bibliography will prove very useful for practitioners and students alike it is disappointing that it cannot be kept more up-to-date nor contain more information of the contents of articles and books. The effort for the inquirer will thus still be substantial, but considerably less than that required to search through other bibliographies which cover the subject. The book is clearly aimed at libraries and will not have anything like the circulation of say the *Journal of Economic Literature*, which does give abstracts but is tedious to use because of the large number of different volumes which have to be consulted.

National Institute of Economic David G. Mayes
and Social Research

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Volume 11 No 43 Summer 1981

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The Usefulness of Accounting and Other Information Disclosed in Corporate Annual Reports to Institutional Investors in Australia

R. Anderson

Introduction

In recent years empirical studies have been conducted into the usefulness of corporate annual reports to individual investors.¹ The findings of these studies have provided conflicting evidence on the value of annual reports to such investors in making investment decisions.² Since these studies have been concerned only with individual investors it would seem that a gap exists in our knowledge concerning the usefulness of annual reports to institutional investors.³ Furthermore, the withdrawal of the individual investor from the share market has been accompanied by an increased level of investment on the part of institutional investors.⁴ Given the important role such investors play in the supply of funds to the capital market it would seem that the accounting profession should be paying greater attention to meeting the information requirements of such investors.

¹Marc J. Epstein, *The Usefulness of Annual Reports to Corporate Shareholders*, California State University: Los Angeles, Bureau of Business and Economic Research, 1975; T. A. Lee and D. P. Tweedie, 'Accounting Information: An Investigation of Private Shareholder Usage', *Accounting and Business Research*, Autumn 1975.

²For a synthesis of prior studies see Ray Anderson, 'The Usefulness of Annual Reports to Australian Investors', Paper presented at the Accounting Association of Australia and New Zealand 1979 Conference, University of Melbourne, 1979.

³The only prior studies in this area are: Robert C. Clift, 'Accounting Information and the Capital Market', in *Australian Company Financial Reporting*, Australian Society of Accountants, Bulletin No. 18, Melbourne, 1975 and K. S. Most and Lucia Chang, 'An Empirical Study of Investor Views Concerning Financial Statements and Investment Decisions', Collected papers presented at The American Accounting Association Annual Meeting, August 20-23, 1978.

⁴Richard Dobbins, 'The Institutional Shareholder in the UK Equity Market', *Accounting and Business Research*, Winter 1974. Michael Lawrisky, *Ownership and Control of Australian Corporations*, Transnational Corporations Research Project, University of Sydney, 1978.

The purpose of this paper is to report the findings of an empirical investigation into the usefulness of annual reports to institutional investors in Australia. A mail questionnaire was forwarded to a sample of 300 institutional investors selected from the share registers of fifteen Australian companies. One hundred and eighty eight responses were received from the 298 questionnaires delivered, representing a response rate of 63.08%.

Investment objectives

The economic problem confronting investors is the choice of the best consumption pattern available over time.⁵ The acquisition of ordinary shares involves a sacrifice of present consumption (represented by the purchase price), in expectation of increased consumption at some future point in time. Assuming rationality, for investment to be undertaken the expected present value of future cash receipts to the investor must exceed the purchase price.⁶

In order to determine the objectives underlying investment decisions, institutional investors were asked the following question: 'When making decisions about buying, holding or selling ordinary shares, what are your important objectives?' Each investment objective given by the question had to be ranked by respondents using a five point scale where one means maximum importance and five denotes no importance. The responses to this question are summarised in Table 1. From this table it can be seen that institutional investors

⁵Charles W. Haley and Lawrence D. Schall, *The Theory of Financial Decisions*, New York: McGraw Hill, 1973, p. 16.

⁶For a formal expression of the investment decision see the American Accounting Association Committee on External Reporting, 'Evaluation of External Reporting Practices—A Report of the 1966-68 Committee on External Reporting', Supplement to *The Accounting Review*, vol. 41 (1969).

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Table 1
Institutional Investors' Investment Objectives

Investment Objective	Maximum Importance 1		Great Importance 2		Moderate Importance 3		Slight Importance 4		No Importance 5		No Information Given	Mean \bar{X}	Standard Deviation S
	No.	% of Total	No.	% of Total	No.	% of Total	No.	% of Total	No.	% of Total			
Dividend Income	50	26.6	83	44.1	52	27.7	2	1.1	—	—	1	0.5	0.768
Profits from Increase in Market Price within Twelve Months (Short-term Capital Gains)	13	6.9	24	12.8	91	48.5	36	19.1	23	12.2	1	0.5	1.033
Profits from Increase in Market Price beyond Twelve Months (Long-term Capital Gains)	44	23.4	69	36.7	61	32.5	13	6.9	—	—	1	0.5	0.889
An Equal Combination of Dividend Income and Capital Gains	83	44.1	52	27.7	47	25.0	3	1.6	3	1.6	—	—	0.944

Table 2
Institutional Investors' Information Sources

Source of Information	Maximum Importance 1		Great Importance 2		Moderate Importance 3		Slight Importance 4		No Importance 5		No Information Given	Mean \bar{X}	Standard Deviation S
	No.	% of Total	No.	% of Total	No.	% of Total	No.	% of Total	No.	% of Total			
Sharebrokers' Advice	20	10.6	43	22.9	90	47.9	29	15.4	6	3.2	—	2.777	0.944
Advice from Investment Services	1	0.5	20	10.6	52	27.7	72	38.3	43	22.9	—	3.723	0.952
Study of Annual Reports	21	11.2	88	46.8	45	23.9	30	16.0	4	2.1	—	2.511	0.962
Newspapers, Magazines and Journals	1	0.5	27	14.4	104	55.3	50	26.6	6	3.2	—	3.176	0.728
Government Publications	—	—	—	—	66	35.1	72	38.3	46	24.5	4	2.1	0.775
Tips and Rumours	—	—	10	5.3	19	10.1	30	16.0	125	66.5	4	2.1	0.886
Visits to Company	40	21.3	56	29.8	27	14.4	19	10.1	42	22.3	4	2.1	1.473

considered an equal combination of dividend income and capital gains their most important investment objective. Dividend income by itself was ranked next in importance followed by long-term capital gains which was considered not as important. The objective of short-term capital gains was rated of only moderate importance.

Information sources

In order to determine the basis on which investment decisions were made, institutional investors were asked the following question: 'When making decisions about buying, holding or selling ordinary shares, what are your important sources of information?' Their responses are summarised in Table 2 from which it can be seen that corporate annual reports are their most important source of information based on mean values. However, as indicated by Table 2, company visits had the highest proportion of first rankings. Forty institutional investors considered visits to companies to be of maximum importance whereas only 21 institutional investors attached the same value to corporate reports. The reliance of a small number of investors on company visits as a major source of information raises the question of whether information disclosed to them is made available to other investors by other means at the same time. If new information is made known to these investors before it is disclosed to other investors then it will provide an opportunity for this minority investor group to earn above normal profits from their market transactions.

Readership and importance of sections contained in corporate annual reports

A major reason for carrying out this study was to ascertain whether or not institutional investors read and find useful corporate annual reports. The annual report was divided into nine major sections and respondents were asked: 'As a general rule, to what extent would you read the following sections contained in the annual report?' The responses of institutional investors to this question are summarised in Table 3. From this table it can be seen that based on mean values the most widely read sections are the balance sheet, profit and loss statement, notes to the accounts and chairman's address. Whilst investors may read some sections of annual reports more thoroughly than other sections, of more interest is whether the information assists them in making

investment decisions. They were therefore asked the following question: 'In making decisions about buying, holding or selling ordinary shares, how important are the following sections of the annual report?' Respondents were presented with the same sections and asked to rank them on a five point scale where one means maximum importance and five means no importance. The responses for the hold-sell decision are summarised in Table 4 and the buy decision in Table 5. From Table 4 it can be seen that institutional investors ranked the profit and loss statement, balance sheet and notes to the accounts as the most important sections for making hold-sell decisions. The chairman's address, funds statement, director's report, financial (statistical) summary, statement of accounting policies and auditor's report were considered of only moderate importance. For buy decisions it can be seen from Table 5 that the profit and loss statement, balance sheet, notes to the accounts, chairman's address and funds statement are the most important sections. These sections were ranked as having moderate to great importance to buy investment decisions while the remaining sections were considered to be of only slight to moderate importance.

The desire for additional information

The evidence presented in an earlier section indicated that institutional investors considered annual reports as their most important source of information when making investment decisions. If annual reports are to remain of value it is necessary to determine regularly the information institutional investors require for making investment decisions which is not provided in annual reports. In order to ascertain the information requirements of institutional investors the following open-ended question was asked: 'What additional information do you consider should be published in annual reports?' From a study of responses it was found that they could be classified into the following headings: management, accounting policies, future prospects, company operations. All other items were classified into one category. Some respondents answered that they required no further information, whilst one investor requested a less elaborately produced annual report. The responses to this question are summarised in Table 6.

From Table 6 it can be seen that at least 72.4% of respondents desire the provision of additional information in annual reports. A further 8 (4.3%) answered that they were satisfied with the quan-

Table 3

Institutional Investors' Readership of Sections Contained in Corporate Annual Reports

Sections	Thoroughly 1		Briefly 2		Do Not Read 3		No Information Given		Mean X	Standard Deviation S
	No.	% of Total	No.	% of Total	No.	% of Total	No.	% of Total		
Balance Sheet	150	79.8	32	17.0	6	3.2	—	—	1.234	0.494
Profit and Loss Statement	149	79.3	33	17.5	6	3.2	—	—	1.239	0.497
Chairman's Address	112	59.6	58	30.8	18	9.6	—	—	1.500	0.666
Funds Statement	110	58.5	58	30.9	20	10.6	—	—	1.521	0.682
Directors' Report	81	43.1	88	46.8	19	10.1	—	—	1.670	0.652
Auditor's Report	43	22.9	115	61.2	30	15.9	—	—	1.931	0.621
Notes to the Accounts Financial (Statistical) Summary	133	70.7	44	23.4	11	5.9	—	—	1.351	0.589
Statement of Accounting Policies	72	38.3	96	51.1	20	10.6	—	—	1.723	0.644
	71	37.8	101	53.7	15	8.0	1	0.5	1.701	0.610

Table 4

Institutional Investors' Views on the Importance of Corporate Annual Reports to the Hold-Sell Decision

Section	Maximum Importance 1		Great Importance 2		Moderate Importance 3		Slight Importance 4		No Importance 5		No Information Given		Mean X	Standard Deviation S
	No.	% of Total	No.	% of Total	No.	% of Total	No.	% of Total	No.	% of Total	No.	% of Total		
Balance Sheet	65	34.6	39	20.7	47	25.0	26	13.8	8	4.3	3	1.6	2.314	1.211
Profit and Loss Statement	64	34.0	37	19.7	62	33.0	16	8.5	6	3.2	3	1.6	2.259	1.122
Chairman's Address	15	8.0	39	20.7	88	46.9	17	9.0	28	14.9	1	0.5	3.021	1.107
Funds Statement	21	11.2	13	6.9	88	46.8	32	17.0	29	15.4	5	2.7	3.191	1.144
Directors' Report	12	6.4	21	11.2	89	47.3	29	15.4	32	17.0	5	2.7	3.262	1.083
Auditor's Report	23	12.2	11	5.9	60	31.9	26	13.8	66	35.1	2	1.1	3.543	1.352
Notes to the Accounts Financial (Statistical) Summary	35	18.6	47	25.0	50	26.6	28	14.9	24	12.8	4	2.1	2.777	1.284
Statement of Accounting Policies	11	5.9	42	22.3	53	28.2	38	20.2	43	22.9	1	0.5	3.321	1.220
	11	5.9	21	11.2	87	46.3	30	15.9	37	19.7	2	1.0	3.328	1.098

Table 5
Institutional Investors' Views on the Importance of Corporate Annual Reports to the Buy Decision

Section	Maximum Importance 1		Great Importance 2		Moderate Importance 3		Slight Importance 4		No Importance 5		No Information Given		Mean \bar{x}	Standard Deviation s
	No.	% of Total	No.	% of Total	No.	% of Total	No.	% of Total	No.	% of Total	No.	% of Total		
Balance Sheet	55	29.3	45	23.9	47	25.0	21	11.2	10	5.3	10	5.3	2.360	1.196
Profit and Loss Statement	74	39.4	34	18.1	46	24.5	16	8.5	8	4.2	10	5.3	2.157	1.192
Chairman's Address	32	17.0	30	16.0	68	36.2	27	14.4	21	11.1	10	5.3	2.860	1.225
Funds Statement	30	16.0	27	14.3	68	36.2	27	14.4	26	13.8	10	5.3	2.955	1.252
Directors' Report	11	5.9	33	17.5	70	37.2	28	14.9	35	18.6	11	5.9	3.243	1.154
Auditor's Report	10	5.3	19	10.1	48	25.5	41	21.8	59	31.4	11	5.9	3.658	1.203
Notes to the Accounts	30	16.0	47	25.0	54	28.7	22	11.7	25	13.3	10	5.3	2.803	1.262
Financial (Statistical) Summary	9	4.8	41	21.8	72	38.3	27	14.4	32	17.0	7	3.7	3.177	1.121
Statement of Accounting Policies	10	5.3	34	18.1	77	40.9	28	14.9	31	16.5	8	4.3	3.200	1.106

Table 6
Institutional Investors and Their Desire for Additional Information

Information Category	No.	% of Total
Management	4	2.1
Accounting Policies	43	22.9
Future Prospects	8	4.3
Company Operations	74	39.4
Other	7	3.7
None	8	4.3
Less Expensive	1	0.4
No Reply	43	22.9
Total	188	100.0

tity of information presently available in annual reports.

Management

A majority of responses in this category sought disclosure of the total remuneration of directors including all other benefits received from holding office as director. The next most desired piece of information was disclosure of directors' trading in the company's shares during the past year.

Institutional investors also desired information on the business interests of, and other directorships held by directors.

Accounting policies

The most frequently requested item in this category was the provision in the financial statements of the current value of non-current assets. Investors also favoured disclosure of information concerning the adequacy of the depreciation charge, the current value of shares held in private companies, changes in accounting policies and the reasons and the disclosure of all off-balance sheet transactions.

Future prospects

Only eight institutional investors desired a forecast of future sales and profits, which suggests that they would prefer to make their own estimates of future earnings per share.

Company operations

The most common request in this category was for information about company product(s), including major brand names, whether the company was improving its share of the market, and the quality of the products. Other investors

desired some form of divisional reporting with disclosure of sales revenue, profitability and the amount of assets employed for each division.

Other

Five institutional investors requested the publication of quarterly reports and two favoured the inclusion of a management audit report in the annual report.

The investment valuation model outlined earlier postulated that institutional investors when making investment decisions will seek to maximise their utility. In making such decisions, investors are faced with uncertain choice situations. Investors will therefore value information received which will reduce the uncertainty they face and assist their decision-making process. However, whilst investors may favour the disclosure of additional information in annual reports for this reason, there are costs associated with such disclosure and investors must compare the benefits obtained with such costs. Information is, as Demski points out, '... a commodity whose acquisition like that of other commodities constitutes a problem of economic choice'.⁷

As has been shown in Table 6, 72.4% of institutional investors are in favour of additional disclosure of information in annual reports. In order to determine whether this view would hold when it was recognised that there was a cost involved, they were asked the following question: 'If the provision of this additional information were to increase the cost of producing annual reports, reducing earnings and perhaps dividends would you still favour the inclusion of such information?' It was found that 69.1% of these investors favoured the provision of additional information even if it reduced earnings and ultimately dividends. Many respondents considered the costs involved would be small and would not affect dividends significantly.

Conclusion

Whilst empirical studies have been conducted into the usefulness of corporate annual reports to individual investors, little is known about their utility to institutional investors.

In order to determine the usefulness of annual reports to such investors, a mail questionnaire was forwarded to 300 institutional investors in Australia. The findings of this investigation indi-

⁷Joel S. Demski, *Information Analysis*, Massachusetts, Addison-Wesley, 1972, p. 2.

cate that institutional investors attach most importance to the investment objective of an equal combination of dividend income and capital gains. However, dividend income, by itself, is ranked more important than long-term capital gains.

It was also found that institutional investors when making investment decisions ranked the annual report as their most important source of information, followed by sharebrokers' advice and company visits. The most widely read sections of the annual report were the balance sheet, profit and loss statement, notes to the accounts and chairman's address. The most important sections of the annual report for making investment decisions are the profit and loss statement, balance sheet and notes to the accounts. When asked if they desired additional information to be provided in annual reports, 72.4% indicated that they favoured increased disclosure on remuneration, trading in the company's shares and other direc-

torships held by directors. Institutional investors also favoured disclosure of the current value of non-current assets and investments, changes in accounting policies and the reasons and the disclosure of off-balance sheet transactions.

Institutional investors also desired information on future prospects, company products, divisional performance, the provision of management audit reports, and the publication of quarterly reports. Furthermore, 69.1% of the above respondents still favoured the provision of such information even if it led to reduced earnings and ultimately dividends.

The findings of this empirical investigation have indicated that annual reports are viewed as an important source of information by institutional investors in Australia. It can therefore be concluded that if annual reports are to retain their importance as a source of information their contents should be tailored to meet the information requirements of institutional investors.

Forthcoming Conferences

The next Conference of the *Association of University Teachers of Accounting* will be held at the University of Lancaster in April 1982.

The next Conference of the *European Accounting Association* will be held at the University of Aarhus, Denmark in April 1982.

Walter Taplin Prize

The Association of University Teachers of Accounting, the Council of Departments of Accounting Studies and *Accounting and Business Research* offer a prize of £75 for the best article published in each annual volume. The prize is named in honour of the journal's founding editor, Walter Taplin. The winning article in 1979/80 was 'The Lessons to be Learned from the Development of Inflation Accounting in the UK' (Autumn 1980) by C. A. Westwick.

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Annual subscription US\$20 to all subscribers. Subscription and membership inquiries should be addressed to Alfred R. Roberts, Box 92, University Plaza, Georgia State University, Atlanta, Georgia 30303, USA. Manuscripts should be submitted (in triplicate) to: Edward N. Coffman, School of Business, Virginia Commonwealth University, Richmond, Virginia 23284, USA.

Some Noteworthy Theories from the French and Swiss Tradition in Accounting

V. P. Filios

During the first half of this century, accounting as a science seems to have been advanced in German and French speaking countries rather than in the English speaking world. In Germany, the 'business economics' school had been already formed by the very beginning of the century and in 1906 its founder, Eugen Schmalenbach, started to edit the journal *Der Zeitschrift für Handelswissenschaftliche Forschung*, where two years later he published the first elements of his 'dynamic accounting'.

The 'business economics' school of thought dealt with the (internal) organisational behaviour of corporations and was not a positively scientific approach since its main support came from observation. In other words, the laws of causal relationship had restricted use for this approach which was distinguished by its teleological orientation, namely the pursuit of means for the achievement of a prespecified goal. The 'German school' and its variations within Germany (the school of Cologne—founder E. Schmalenbach; the school of Frankfurt—founder F. Schmidt, etc.), had branches and followers in Holland, Austria, Switzerland and elsewhere in continental Europe. Moreover, it had also greatly influenced well known French and Italian accountancy theorists. Its ultimate purpose can be briefly described as the analytical study of mainly private, economic entities with a methodology that encompasses an integrated examination of their organisational, administrative, economic and accounting aspects.

On the other hand, in the French speaking world (France, Belgium, Switzerland, etc.), a parallel evolution, purely, however, within the accounting framework took place during the same period. The first stage of this accounting evolution can be traced back to 1888 when the personalistic theories of accounting, that Cerboni

several years earlier had almost perfected, were further elaborated.¹

Professor J. F. Schär, who taught in Switzerland during the first years of the century and later in Berlin, initiated the German stream of legalistic theories of accounting, with Professor H. Nicklisch, also of Berlin, as his main follower (together with Le Coutre they developed the static accounting theory) and A. Beaumont, R. Lefort and others as their followers in France.² This was the second evolutionary stage in the theoretical development of accounting during the twentieth century. The theories of economic accounting were refined upon simpler materialistic ones whose initial exponent, Joseph Szarka, published his book in 1822. Exponents of the materialistic views on accounting theory were Coffy, in France, whose book was published in 1833, and Francesco Villa in Italy. Finally, the founder of the French school of theories of economic accounting is considered to be René Delaporte although its great theorist was Jean Demarchey.

All the aforementioned schools of accounting thought dealt with theories of economic accounting only and, whether financial or managerial, their accounting theories were mainly normative in nature. In parallel, however, we have the more significant development of a French school of pure theories of accounting, whose founder is

¹Giuseppe Cerboni, *Logismographia*, 1873. His theory found wide use in the then State of Italy as governmental accounting. The initiator of the personalistic views on accounting theory in France was L. Barrachin whose 1888 book *Théorie de la comptabilité en parties doubles par un mathématicien* is a remarkable exposition of this school of accounting thought.

²J. F. Schär (ed.), *Buchhaltung und Bilanz*, Berlin, 1922; H. Nicklisch, *Wirtschaftliche Betriebslehre*, Stuttgart, 1922; H. Nicklisch, *Die Betriebswirtschaft*, 7 Aufl., 1932; A. Beaumont, *Méthode nouvelle de journalisation à parties doubles entièrement basée sur le droit*, La comptabilité et les affaires, 1920; Robert Lefort, *La comptabilité expliquée au profanes*, Paris, 1927.

generally considered to be P. Garnier and the leading exponents, E. de Fages and J. Sigaut.

This paper is a brief introduction to the theories of some outstanding French accounting theorists. The Swiss accounting historian and theorist Léon Gomberg and his views are also included here since they are quite pertinent to the French tradition as well as opposing the *Betriebswirtschaftslehre* (business economics) school.

René Delaporte and the Economics of Corporate Accountancy

René Delaporte is the French accounting writer who exerted the greatest influence in the fields of accounting theory and techniques of all contemporary accounting scholars. Delaporte, who died in 1942, was a very curious personality and his life constitutes an extraordinary journey.³ He was, in turn, a man of letters, a great colonial civil servant, a professor of commercial sciences, professor at the American University of Beirut, a businessman, a teacher, general superintendent of the issuing bank of the Portuguese colonies, etc. Holder of six university degrees, laureate of diverse academies, member of several ministerial commissions, Delaporte was the author of numerous works and innumerable studies of economic, legal and accountancy matters. While his articles in specialised publications class him among the great anthropologists, his works on accountancy have had a great impact not only in his homeland, but also abroad. His works include *La lecture du bilan* (Paris, undated), *La comptabilité d'après les principes rationnels basés sur les mouvements de valeurs et les grandeurs arithmétiques* (Paris, undated) and above all his masterpiece published in the Roret Encyclopaedia, 1936 edition, *Méthode rationnelle de la tenue des comptes*.

Delaporte belongs explicitly to the economic school of value. In fact, he declares:⁴

In our conception, there are no real or personal accounts, or any other kind. The account is arithmetical and statistical to our knowledge, that is to say, it must express quantities and figures. Thus we only have *accounts of values* which are generally classed in two groups: (1) asset accounts and (2) liability accounts representing: (1) the values possessed by the enterprise, labelled assets (*patrimoniales*); (2) the

legal values of debts and liabilities; the values of result profits or losses of the capital owner; sales of economic shares. The account has two principal functions, the one statistical (enumeration of values); the other classificatory (grouping of values in the same way)... In our rational doctrine, the accounts of things, of people, of the capital owners, are all accounts of values and we are unaware of this distinction between accounts—(general, personal, etc.) for we have a unity. It is this unity of the account of values that we are going to analyse....

Yet it would be superficial to rank Delaporte in the theory of value and as a result, in the theory of economic accounting, without surrounding this affirmation with numerous restrictions.

First of all the conception of 'value' which Delaporte had is very broad. He puts under this heading all that has any title whatsoever attached to enterprise and which, according to him, must be accountable: real property, services, established-verifiable rights. One can consider him as partially belonging to the legalistic school of accounting theory and find many aspects of Delaporte's work touching the fundamental issues of organisational theory of accounting which was at that time in an embryonic state. In his works, he stresses the points of explicit or implicit contact that exist between the organisation and the administration of enterprises, on the one hand and the degree of elaboration of accounting techniques used, on the other.

From the legalistic viewpoint he even suggests, as a part of accountancy's mission, recording obligations of 'not doing', sales territories excluded by contract and, more generally, any phenomenon that affects the enterprise. To avoid the relative arguments for the terms 'Debit' and 'Credit', Delaporte adopts the arithmetical signs + (plus) and - (minus); these are the arithmetical signs of the account, in which 'entries' or debits, 'exits' or credits, are accountancy's signs.

Delaporte was for the French tradition what Canning represented in the American tradition of accounting thought through his book *The Economics of Accountancy* (Ronald Press, New York, 1927).

J. Dumarchey: Economic-value Accounting and its Positive Theory

The 'positive theory' of Dumarchey constitutes a good example of the French contributions to accounting thought made during the first half of

³For an interesting biography of R. Delaporte see the journal *La Vie au Bureau*, Brussels, 23rd year, pp. 1, et seq.

⁴R. Delaporte, *Méthode Rationnelle de la Tenue des Comptes*, Encyclopaedie Roret, 1936, p. 95, et seq.

the twentieth century. The fundamental work which contained his theory appeared in 1914 and in a second edition in 1933.⁵

According to M. Jean Fourastié, Dumarchey's original ideas have contributed to a large extent to the progress of the art of accounting.⁶ Apart from his basic work on the 'positive theory', Dumarchey developed also his ideas in two other works which are considered authoritative in their field.⁷ Whatever one may think of his theory nowadays, the way it is presented constitutes without any doubt a very well argued attempt to lay the scientific base on which a sound and robust accounting theory could be constructed.

Like his colleague Delaporte, J. Dumarchey bases his theory on the notion of 'value'. He considers accounting as an independent science belonging to the group of economic and social sciences and from the very first chapter of his 'positive theory' he examines the relationships that exist or should exist between accounting and positive economics (*économie politique*) and he reviews in passing the ideas of the major economists who dealt also with economic accounting:

Without prejudging anything in the definition, of the field of observation, of the accounting method, it is evident for all of us, specialists or laymen, that this discipline can only refer to the questions of production, distribution, consumption of wealth. For this very reason, there should exist a very close link between accounting and positive economics (*économie politique*) and it appears that scholars working on accounting should necessarily be familiar with economics.⁸

Having implanted from the beginning this orientation to his research, Dumarchey begins from one of the basic economic phenomena, that

of value, to explain and justify, by a mathematico-economic process, the phenomenon of accounting under its double-entry form. In order to illustrate his concept of accounts he drew on the classifications used in chemistry, physics and biology, that is on the notion of series and of classes of phenomena and facts, to arrive at his definition of the account (*compte*) as 'any class of units of value':

Let us consider now the class of all the units of value which a given person has at his free disposition, a person who is in a word the proprietor; units of values lying under various forms such as those of money, furniture, real estate, tools, credit, etc. Thus we shall have under our eyes what we shall call the *assets* account of this person. Let us consider similarly the class of all units of value owed to others by this same person and we shall have thus his *liabilities* account. To each unit of value of the liabilities account (*Passif*) let us arrange to correspond a unit of value of the assets account (*Actif*) and so on until we exhaust whichever of the two accounts has the least extension; the group of units remaining will form an account that we shall designate by the name of *net worth* ... The balance sheet is thus the expression of the relation which exists between the assets, the liabilities and the net worth of a person.⁹

Having considered the balance sheet at a given point in time, that is from a *static* (*statique*) point of view, he examines it intertemporally, that is from a *dynamic* point of view (*dynamique*). This distinction between the static and dynamic balance sheet relates Dumarchey to the German school of business economics (*Betriebswirtschaftslehre*) the main exponent of which was Eugen Schmalenbach. (Especially critical of the German author's concepts was the Swiss Léon Gomberg whose criticisms and ideas will be briefly described later on.)

Afterwards, passing on to the application of his theory, Dumarchey studies in succession, under the title 'Static Accounting' (*statique comptable*), the form and the qualitative aspects of the balance sheet, the kinds and types of balance sheets, etc. The influence of Schmalenbach's school is evident in this technical part of his classificatory constructions.

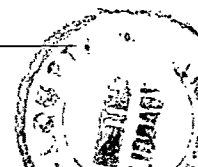
⁵J. Dumarchey, *La théorie positive de la comptabilité*, with a preface by M. Em. Cohendy, Professor at the University of Lyon, 1914 and 1933.

⁶Jean Fourastié, *Comptabilité générale*, Librairie générale de Droit et de Jurisprudence, Paris, 1945, p. 114.

⁷J. Dumarchey, *Théorie scientifique du prix de revient, suivie d'une étude critique sur l'établissement des bases scientifiques de la comptabilité*, Lyon, 1933; *La comptabilité moderne, essai de constitution rationnelle d'une discipline comptable au triple point de vue philosophique, scientifique et technique*, Paris, 1925.

⁸*Théorie positive de la comptabilité*, p. 1. R. Delaporte was the founder of the 'economic school' of accounting in France because of his repeated assertions that accounts ought to be accounts of value (*comptes de valeur*). J. Wilbois and G. Rives were two other influential members, besides Dumarchey, of the same school of accounting thought.

⁹*Théorie positive de la comptabilité*, pp. 101-102.



In a specific chapter of his positive theory, entitled 'Accounting Organology' (*l'organologie comptable*), the author develops what he calls the *integral system* (*le système intégral*) of accounting methodology:

Every science has its own technique, its particular instruments. A chapter on accounting organology imposed itself where, loyal to our method, we ought to lay at first the foundations of a system which can yield answers to the demands of the theory, and to the complexity of all the circumstances and it is for this reason we have named the system *integral* (*intégral*).¹⁰

Examining the work of Dumarchey, Charles Panglaou¹¹ considers it to be the type of theoretical construct achieved from a systematic, but incomplete study, because he has not put accounting in its living environment; it should also have included legal, administrative, financial and other elements. Dumarchey tends to model accounting on physics, continues this critic, from where he gets his taxonomy (*étagement*) of accounting concepts and the elements of his theory: his definition of the dynamic law of accounts of the *dynamic* balance sheet; the *quantitative* study of the balance sheet. Professor Vlaemminck adds that:

The work of Dumarchey as that of Delaporte contains a lot of constructive elements a study of which, at greater depth, would permit us to enrich an almost definitive theory of accounting.

Accounting for Numerical Movements in Space-Time

The theory of E. de Fages combines the three mathematical notions of number and movement in time and space, his theory of accounting emerging as the scientific methodology for numerical, spatial and chronological measurement of a particular nature, or, alternatively, as the scientific methodology whose ultimate purpose is

the enumeration of units moving intertemporally.¹²

According to E. de Fages, to count is to compare a set of things with a unity of that thing. The things to be measured may be similar or dissimilar. The dissimilar things cannot be aggregated directly, e.g. adding sheep and horses; if, however, they are subject to the wider concept 'animals', then, of course, they can be aggregated in one group. De Fages' first condition for the aggregation of things is, therefore, their similarity, i.e. some common feature. They have to be, however, dissimilar too, for easy distinction of one from the other.

If a great number of units (which would be sand grains, globules, micro-organisms or anything else) moving on a plane surface in various directions are to be examined, it is necessary, in order to aggregate them, to confine the process to those units that are within a prespecified perimeter.¹³ This is the second condition in E. de Fages' theory of accounting. In other words, the plane surface is a field of observation with well-defined boundaries. On it the units (like micro-organisms) are in motion. The field of observation is divided into smaller areas or zones in order to have the specification of movements' tracks made more accurately. The movements of units and their entrance-exit to the prespecified field are noted by the observers-measurers (*démons subtils*). No specific interrelationship and no connective law exists necessarily among unit movements to be ascertained or, in other words, the field under observation does not exercise any influence upon the units, which move therefore freely.

As shown in Figure 1, the perimeter of the rectangle separates the inner zones A, B, C, D, ...¹⁴ (e.g. assets) from the outer ones W, X, Y, Z, ... (e.g. liabilities). The observers exercise somehow the duties of 'door-keepers' of the inner zones by noting, however, not only the entries and exits to those zones but also their corre-

¹²Eugène de Fages, Civil Engineer, (*Ingenieur des ponts et chaussées*), *Les concepts fondamentaux de la comptabilité*, Paris, 1924 (48 pp. in total). See also Léo Chardonnet, *Technique comptable générale*, p. 453, and Marcel Mommen, *Le plan comptable international*, 1958. For the best critique of E. de Fages' theory see Marios Tsimaras, *Essai critique sur les fondements de la comptabilité*, Paris, 1932.

¹³The definition of a corporate entity and the observation of its activities from a social point of view is an instance of having to make such a delineation.

¹⁴Namely accounts. According to E. de Fages, an account is every set of distinguishable units which can be grouped on the basis of at least one common feature at any point in time.

¹⁰J. Dumarchey, *Théorie positive*, p. 287.

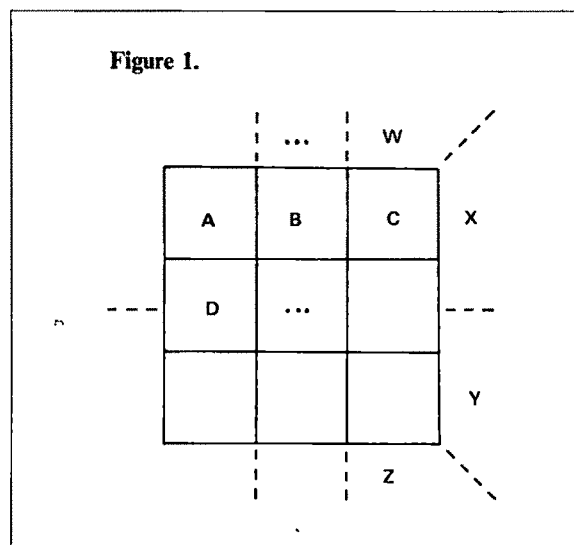
¹¹As quoted by Joseph H. Vlaemminck, *Histoire et doctrines de la comptabilité*, Université Catholique de Louvain, Collection de l'Ecole des Sciences Économiques, No. 52, p. 207.

sponding origins and destinations¹⁵ (thus keeping track of both the entries and exits to the outer zones too). Each entry is a debit and each exit is a credit. The inner zones (the assets), are initially empty and, therefore, without having anything entered in the records, accept and take notice of entries (at some inflow rate) and thereafter, of exits. The outer zones (liabilities), on the other hand, have also initially some exits and thereafter entries at some outflow rate.

When the observers of each zone have finished with the measurements of a certain time period, they pass them on to the headquarters where the 'Master' of measurement and aggregation is based, namely the final measurer. If the perimeter were widened, and each observer were to pass his 'partial' observations-measurements for infinitesimal time periods, there would be a practically continuous provision of information about everything. The description here concerns the simplified case of movements on a plane surface; nothing changes, however, if the trajectories of the units were of any other kind.

In applying his pure theory of accounting,¹⁶ E. de Fages envisages zones as being not just various forms of space but also legal rights or economic variables and values and generally, classes of units of any nature.¹⁷

In his remarkable work E. de Fages represents the subject of accounting as a thin film of water where 'infused units' (*infusoires*) move around in order. The fact that de Fages was a civil engineer explains his reference to symbolic representations and analogies drawn from biology, mathematics and physics.¹⁸ For him the problem is to count the 'infused units', at each instant indicating their location on any section of the thin film of water. Panglaou rejects this analogy on the grounds that it represents badly the diversity of the object of accounting itself; that it considers the problem only from external aspects and with a particular manifestation: physical movements. He could



have enlarged the problem by envisaging also valuable rights as well as changes in intangibles.

J. Sigaut does not hesitate to recognise E. de Fages as one of the principal provokers of research into the area of pure accounting:

It was necessary for strangers to the field of accounting, such as de Fages who, working on the problem,¹⁹ succeeds in demonstrating that the method used is entirely general and is liable to find applications in the most diverse fields. This pure theory of accounting has been remarkably represented by schemes by de Fages.... It is a work that has become almost classic, or at least deserves to be so.²⁰

E. de Fages, like his follower Sigaut, worked mainly on the domain of double-entry accounting and this might be considered a reason for not advancing very far the French phenomenon of pure accounting, unique in the whole history of accounting thought. He combined the duality concept with elementary mathematics in order to give a simplified version of the way pure accounting could be: if the sums that are carried in two parallel columns are correspondingly equal then the totals of these columns are equal. If we transcribe all these sums on cards—whatever their serial number or order is—but recognising only which one bears the left and which one bears the right column, then the total of all the transcriptions of the left will be equal to that of the right

¹⁵As well as the moment of their entry and exit (hour, day, month, year, etc.).

¹⁶Thus, according to de Fages, the simplest theory of accounting would be one which would order sets of numbers expressing quantified characteristics. This is in fact (in its simpler form) the case of binary system in numerical analysis.

¹⁷For a similar use in the American literature see, for instance, Edith T. Penrose, 'Biological Analogies in the Theory of the Firm', *American Economic Review*, December 1952, pp. 804-819; Alchian, Armen A., Stephen Enke, and Edith T. Penrose, 'Biological Analogies in the Theory of the Firm: Comments and Rejoinder', *American Economic Review*, September 1953, pp. 600-609.

¹⁸As quoted by J. H. Vlaeminck, *Histoire et doctrines...*, p. 214.

¹⁹Of constructing a pure theory of accounting.

²⁰Jean Sigaut, *La comptabilisation des quantités en partie double*, Paris, Delmas, p. 59 and p. 67.

and will equal also the total of each column. If we cut this deck of cards in two parts the balance obtained from the difference in the one will be equal and of opposite sign to the difference obtained in the other part; and so on.

Since a pure theory of accounting should be free from the duality concept that governs conventional accounting theories, it appears that the theory of de Fages did not actually reach the ideal form of such a theoretical construct.

Professor T. E. Gambling, commenting on Richard Mattessich's 'duality assumption' makes the same point (in his revolutionary article, 'A System Dynamics Approach to Human Resource Accounting', *Accounting Review*, July 1974, p. 541):

At present, the accountant always wants to talk of increments and decrements over a finite period of time, and of values at some point in time; this is fair enough as a description of the behaviour of a cash flow or any other physical flow, but it is very near meaningless when applied to a dynamic system.

Because economic events are dominated by a process of transfers in/out, input/output, give/take, very few pure accounting theorists are brave enough to try to get rid of the duality concept (as Professor Gambling has done in his writings), a necessary step for non-economic accounting systems.

Accounting for the Precedence of Quantities over Values

J. Sigaut²¹ maintains that accounting must get rid of the 'monopoly' of value and move toward monitoring quantities of any kind. Any quantitatively measurable phenomenon can be the object of accounting, provided its dual representation provides useful information. Pure accounting, according to Sigaut who was a follower of de Fages, does not record differences, but equalities. Profits and losses, which the theory of de Fages cannot explain clearly, are socio-economic concepts and not concepts inherent in pure accounting. In pure accounting: entries = exits or debits = credits. However, in a theory of accounting which uses values, a rise in the prices of goods would be conceived as: a debit of these goods' accounts $\text{£}x = \text{credit } \text{£}x$ of some sort of 'social account' in

which case there would not be difference (profit) but equality.²²

Sigaut proposes entries and postings in Kgs, Kwh, hrs, m^2 , m^3 , etc., i.e. in measures of natural sciences, without of course excluding monetary units. Since these quantities are heterogeneous, he proposes that the common unit of measurement is an abstract unit, i.e. the number 1. The addition, however, of heterogeneous quantities, especially to the monetary ones (given that the cash and bank accounts as well as the debtors and creditors accounts are by necessity and because of legal obligation kept in monetary units) poses the three following problems:²³

- (i) The connection of the terms of each double-entry, which must show now a relationship and interpret an event.
- (ii) The arithmetic equality necessary for any control, which means equality of abstract numbers. Thus, for instance, if 100 kg of wheat are transformed into 80 kg of flour, a 'balancing' account will operate to account for the difference of 20 kg.
- (iii) The equality of debits to credits, which must not be confused with the arithmetic equality and which means the complete representation of an event, the final equivalence of the terms of a double-entry. This third condition is not necessarily fulfilled.

Thus even the capital account as well as the profit and loss account are, according to Sigaut, artificial 'balancing' accounts. Nonetheless, the balancing account of Sigaut could contain differences not only of an economic nature (e.g. profits) but also the ones which result from the corresponding accounting system itself, namely differences of quantities. That is why in practice Sigaut envisages three types of accounting for quantities: (a) independent, (b) parallel, and (c) incorporated within the monetary accounting itself.

Sigaut's theory is not an integrated theory of accounting; it is rather a system of applied accounting which could be used for materials and foreign currency accountability where quantity as well as value play equally important roles.

Sigaut was strongly opposed to any legalistic influence upon accounting forms and methods:

The idea that any accounting entry translates a legal fact is a remnant of the traditional con-

²¹J. Sigaut, *La comptabilisation des quantités en partie double*, Paris, 1951, pp. 70-80.

²²Sigaut, following de Fages, considers that the equality of debits to credits is the most basic in any kind of double-entry accounting.

²³J. Sigaut, *op. cit.*, pp. 79-80.

ception of accounting. There are two aspects in accounting that are sometimes confused when appearing on the same item (entry). There is the expression of the relations of the enterprise with a third party and there is also an indication of movements internal to the enterprise itself. In external accounting one is effectively translating legal facts but this is not always the case. The account Capital does not, for example, express any longer the credit of the capitalist, any more than the balance of the Profit and Loss account expresses a right of the partners-shareholders. And if we consider internal accounting we can no longer find any legal fact (behind it).²⁴

In another part of his influential work Sigaut emphasises the subjective utility of the information that accounting provides in order to arrive at the conclusion:

No *a priori* conception, whether legalistic, financial or any other, should preside over the determination of the accounting event (*fait comptable*); there is only one law of selection: the law of usefulness. Accounting is essentially a means of (passing) information; its technique should thus be used every time the need is felt for some piece of information.²⁵

Working towards his pure theory of accounting he stresses that

If we succeed in abandoning the notion of value in order to pass to that of quantity, every phenomenon that can be enumerated can also be accounted for and it must be if its recording, according to the method of double entry, is able to supply the manager of an enterprise with a useful piece of information.²⁶

Vlaemminck points out that Sigaut's thesis stems from his preoccupation with book keeping and from his assertions that accounting expressed in quantitative terms is in line with the origin and development of accounting (a view which Vlaemminck also shares). In relation to the latter view, Vlaemminck writes:

There is no known example of double-entry accounting that is not accounting in monetary

units. (There would possibly exist in some primitive societies an accounting for rights (*titres*) in quantitative terms and with double-entry, but we have never had the opportunity as yet of finding one.)... The monopoly exercised by value-accounting on double entry is in full force. From the instant that something is not expressed in value it cannot be considered.

Again this French authority on accounting uses the expression 'pure accounting' (*comptabilité pure*) for his theoretical construct, although this does not correspond adequately to such a conception since it lies within the framework of double entry accounting. Furthermore his theory has been loaded with conventions and procedures of the traditional double entry methodology up to the point that it becomes an inadequate instrument for various domains outside the sphere of economics.

Accounting for Sets of Persons and/or Things

Accounting usually refers to sets of assets and liabilities whose common feature is the ownership to which they are subject. In these sets of assets and liabilities the elements essential for accounting are:

Set: assets and liabilities which enter accounting must constitute, on the basis of certain characteristics, clearly specified sets.

Classification: assets and liabilities which enter accounting must be classified in homogeneous classes.

Quantity: assets and liabilities which enter accounting must have some quantitative form of representation.

The ownership, however, is not something necessary to accounting. The sets which enter accounting can be not only sets of assets and liabilities but any other kind. Thus, the object of accounting can be sets of persons or even societal groups. Therefore, if we have a description of the quantitative evolution of a set of persons or things with the objective to know integratively and continuously the evolution being realised, this description should be considered as pure accounting. Because of this, accounting should have a wider definition which, according to P. Trelut, would be as follows:

The objects of accounting techniques are sets of persons and/or things classified in homo-

²⁴Jean Sigaut, *op. cit.*, p. 64.

²⁵*Ibid.* 59.

²⁶*Idem*, pp. 13-15.

geneous classes and expressed quantitatively in uniform units (for each class). Accounting aims at an integrative and continuous observation of such sets through tables which describe an initially given situation in all classes as well as the quantitative evolution in time of all the changes which occur in each class that finally appear as periodic results due to additions in and differences between classes.

Proper criteria have to be used in such an accounting observation so that a correct formation of sets and a practicable classification of persons and/or things in homogeneous classes will be made. Trelut's abstract theory of accounting can be summarised as follows:

$$A_0 = L_0 + NW_0$$

$$d_i + b_d = d_d + b_i$$

and in accounting terms it would be:

Debits

A_0 = Initial set of assets

d_i = Analytical (elemental) increases of the sets

b_d = General (synthetic) decreases of the sets

Credits

NW_0 = Initial set of net worth

L_0 = Initial set of liabilities

d = Analytical decreases of the sets

b_i = General increases of the sets

P. Trelut classifies the elements of the balance sheet into:²⁷

- (a) Analytical (= Assets and Liabilities) and
- (b) General, or synthetic.

What are, according to Trelut, analytical increases of a set are also increases of assets and decreases of non-equity liabilities too. Such analytical decreases are correspondingly decreases of assets and also increases of non-equity liabilities.

What are, according to him, general increases and decreases of a set correspond to expenditures and revenues and indeed they correspond to increases and decreases of net worth. Trelut adds to stewardship accounting (i) more generalisation, and (ii) the alternative description. In the balance sheet $A - L = NW$ which can be generally expressed as:

$$\text{Minuend} - \text{Subtrahend} = \text{Balance}$$

- (a) The analytical (elemental) description concerns changes in both the minuend and the subtrahend.
- (b) The general (synthetic) description concerns changes in the balance, and
- (c) The alternative description presupposes the interposition of a third term making, therefore, the above equity a triple one:

$\text{Minuend} - \text{Subtrahend} = \text{interposed view} = \text{Balance or, with an illustration:}$

	Debits	Credits
Accounts for an elemental (analytical) description	a	a
	e ₍₃₎	g ₍₅₎
	b ₍₁₎	c ₍₂₎
	f ₍₄₎	e ₍₃₎
Accounts for an alternative description	D	C
	e	e
	D	C
	f	f
	D	C
	g	g
Accounts for a general description	D	C
	h	h
	Debits	Credits
	c ₍₂₎	b ₍₁₎
	g ₍₅₎	f ₍₄₎
	d	d
	h	h

Finally, the interposition can be manifold:

D	D	C	D	C		C
a	a	a	a	a		a

An alternative description is not always necessary. In the pure abstract theory of Trelut's accounting we can, therefore, conceive analytical (elemental) increases-decreases in the minuend or

²⁷In a similar distinction P. Moutier proceeded, in 'Essai sur l'organisation rationnelle de la comptabilité à parties doubles', cited by Leo Chardonnet, *Technique comptable-générale*, p. 454.

the subtrahend of a subtraction and general increases-decreases in the balance, namely:

Minuend - Subtrahend = Balance

$$(M_1 + M_2 + M_3 + \dots + M_n)$$

$$- (A_1 + A_2 + A_3 + \dots + A_m) = R$$

where M_1, M_2, \dots, M_n and A_1, A_2, \dots, A_m are the numerical factors that can formulate a subtraction like the above one or an equity of the form:

$$(M_1 + M_2 + M_3 + \dots + M_n)$$

$$= (A_1 + A_2 + \dots + A_m) + Y$$

and, therefore, any set whose subsets can take the form of a polynomial equation verifiable after any change occurred in its factors (which show the magnitude of each class) is a potential subject of pure accounting.

Demographic Accounting

The original conception of demographic accounting is attributed to Pierre Garnier. According to him the ordered groups of accounts in demographic accounting would be:

- (1) The groups C which show the population classified according to the causes of its changes.
- (2) The groups S which show the population classified according to sexes.
- (3) The groups P which show the population classified according to professions.
- (4) The groups N which show the population classified according to nationality.²⁸

For these four groups we have accordingly:

$$C_1 + C_2 + \dots + C_i = \pm \quad \text{or} \quad \sum_{v=1}^i C_v = \pm D_1$$

$$S_1 + S_2 + \dots + S_k = \pm \quad \text{or} \quad \sum_{v=1}^k S_v = \pm D_2$$

$$P_1 + P_2 + \dots + P_m = \pm \quad \text{or} \quad \sum_{v=1}^m P_v = \pm D_3$$

²⁸This could mean in the case of Switzerland, for instance, the French, German and Italian cantons, or in the case of the USSR the various federal socialist republics, e.g. Kazakh, Ukraine, Lithuania, Turkmen, etc.

$$N_1 + N_2 + \dots + N = \pm \quad \text{or} \quad \sum_{v=1}^n N_v = \pm D_x$$

where $\pm D$ equals the change of a given population during a certain 'accounting' year, and according to certain classificatory criteria.

Pierre Trelut defines as population a set of persons clearly defined, which includes all persons of the same nationality. The persons in this set—using this accounting approach—must be classified in homogeneous classes (subsets) according to proper criteria. These persons (and/or things) must be measured on the basis of a clearly defined unit: i.e. single person, family, etc. (or for things, using a unit for things).

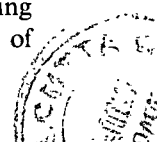
Quantitative expression would allow the determination of:

- (1) The union of all classes (subsets) in which persons or things are classified according to a specific criterion. These classes correspond to groups of assets or non-equity liabilities of conventional accounting.
- (2) The general synthesis of the aforementioned sets to a set which corresponds to the 'net worth' of conventional accounting.

Accounting for sets of persons (or things) entails:

- (1) Description which, after the assessment of the initial situation of the 'net worth' set (classified by classes—subsets), shows the 'transactions' that involve changes in each of the classes of persons (or things).
- (2) A general description which, after the assessment of the initial situation of the 'net worth' set, would show the transactions within this set that involve changes of any other nature.
- (3) Finally, an alternative description of the set which would show the 'transactions' that involve changes of any other nature.

Trelut gives, as an application of his generalised form of theory, the accounting for the population of a 'state'. The system is a rather theoretical structure, the application of which requires a huge organisation and hence it might be argued that it becomes practicable only with the use of computers of the third generation. The accounting approach to the demographical examination of



the population of a 'state' has, according to Trelut, as a first step, the specification of subsets according to geographical areas. In each subset-area the population is classified according to:

- (i) sex (male, female)
- (ii) age (children, youths, middle-aged, old)
- (iii) marital status (married, unmarried)
- (iv) profession.

The analytical description entails the opening of an account for each class of persons by recording the initial demographic situation and thereafter posting changes (increases-decreases) in the classes-subsets.²⁹

The general description includes:

The accounts which show the demographic 'profits and losses' according to their causes: births, deaths, immigrations, etc.

An account named 'General Population' which would contain the initial population \pm the net demographic results of the 'accounting' year.

An account in which all the changes in groups of subsets would be shown for a given 'accounting' period, the purpose being the collection of information for decision-making by public administration (e.g. with reference to the problem of urbanisation or rural depopulation).

Finally, according to the alternative description that Trelut suggests, accounts are set up to show e.g. the number of unemployed who obtain a job or vice versa during the given 'accounting' year.

Léon Gomberg and the Scientific Foundation of Accounting

Switzerland was among the first European countries to found business schools at a university level (e.g. the Handelshochschule in Zurich) and it was the first country in the world to establish a chair of business (*Handelsbetriebslehre*), the first professor being the famous J. F. Schär (1903) who became afterwards professor in the Handelshochschule of Berlin when it was founded in 1906. J. F. Schär and L. Gomberg are the founders of a very significant school of accounting thought in

Switzerland, whose students and followers were pioneers and scholars in the fields of *Einzelwirtschaftslehre* (science of micro-economics) and accounting.

Léon Gomberg was born in Russia in 1866. In 1892 he moved to Switzerland where he completed his studies. He taught accounting at the newly established Handelshochschule in St. Gall from 1899 until 1905. Afterwards he moved to Geneva, where he remained until his death in 1935, when he was 69 years old. He practised the accounting profession as an *expert comptable* and he was president of the Swiss association of practising accountants. He was awarded a doctorate from the University of Geneva *honoris causa* and wrote many excellent works in German and in French, which made him famous outside Switzerland. His main works were:

La science de la comptabilité, Geneva-Paris, 1897.

Handelsbetriebslehre und Einzelwirtschaftslehre, Leipzig, 1903.

Grundlegung der Verrechnungswissenschaft, Leipzig, 1908.

L'economologique—la science comptable et son histoire, Geneva, 1912.

Histoire critique de la théorie des comptes, Geneva, 1929.

Eine geometrische Darstellung der Buchhaltungsmethoden, Berlin, 1927.

La doctrine de la comptabilité (posthumous memoirs published in Paris by the association *Les Amis de Léon Gomberg* in 1937).

Many accounting scholars have analysed the work of Léon Gomberg, among them Paul Emile Cassandro, professor of accounting at the University of Bari (Italy), who wrote a detailed study of Swiss theories of accounting and business economics which he published in 1932-33 in the journal *Rivista Italiana di Ragioneria*. Pietro D'Alvise taught accounting for fifty three years at the universities of Bari, Padua, Genoa, Venice, etc. He died in Padua in December 1943 and his last article (at the age of 82) appeared in the journal *Rivista Italiana di Ragioneria* under the title *Non si può dire che 'la ragioneria e la scienza del patrimonio'* (We cannot say that 'accounting is the science of capital') in order to refute Vicent Masi, professor of accounting in Bologna University who supported such a thesis for many years. In October 1937 the *Rivista Italiana di Ragioneria* published an article by D'Alvise under the title 'Concerning one posthumous book by

²⁹I stress the words set-subset because the theories of Garnier and Trelut (I believe) would be better described within the context of the branch of mathematics called 'set theory':

Pierre Garnier, *La comptabilité algèbre du droit et méthode d'observation des sciences économiques*, Paris, 1947.

Pierre H. E. C. Trelut, *Comptabilité rationnelle*, Paris, 1951.

Léon Gomberg (*Sopra un libro postumo di Leone Gomberg*). It is mainly a critique on his book *La doctrine de la comptabilité et les méthodes comptables* which had been published in four languages in Paris on the initiative of the Association of Friends of Léon Gomberg whose chairman was the famous Jean Dumarchey, professor of accounting at Lyon University.

In this article D'Alvise included a significant paragraph of a letter from Gomberg to him dated March 1929, in which Gomberg strongly opposed the treatment of accounting as a branch of business economics by Schmalenbach as being just one of its many aspects. Gomberg considers accounting as a completely independent science by itself.

Gomberg, probably the most profound historian of accounting, frequently criticised the ideas put forward by Schmalenbach in his works. Notably he criticises the title 'Dynamic Accounting' as illogical as the balance sheet is a status (*état*) and the word 'dynamic' presupposes movement. Thus *dynamische Bilanz* must mean 'stationary movement'. As for the rest, the application in accounting of the terms 'static' and 'dynamic' had already been used in accountancy well before Schmalenbach. In effect we find it for the first time in Pisani in 1880.³⁰ However Pisani uses his terms more judiciously; in effect he calls static facts referring to a state (*état*), the state of capital, and 'dynamic' as those that put into movement the elements of capital and transform them.

At a theoretical level, the subject of a theory of Concrete Accounting³¹ stems from some need for an integral and continuous observation of the changes in a given set. If, as Gomberg suggested, there was a case for such an integral and continuous observation of physical phenomena, then accounting could be expanded even to *physics*.

Thus, forces acting upon the same point and along the same straight line with intensities b_1, b_2, \dots, b_n and corresponding forces act at the same point of the same straight line with intensities a_1, a_2, \dots, a_m would compose the resultant force D

$$b_1 + b_2 + \dots + b_n = a_1 + a_2 + \dots + a_m + D$$

and afterwards both the component forces (b, a) and their synthetic force D would be represented.

The general form of physical accounting could perhaps be of the type:

$$\text{Specific forms of energy } (e_1 \pm e_2 \pm e_3 \pm \dots \pm e_n) = E \text{ (quantum of energy or energy in abstract)}$$

It is to be noted, however, that in any general theory of accounting it is very significant to have created classes, a classification system, a chart of accounts (of a social, economic or physical nature) and on the other hand a common unit of measurement of the variables that constitute the classes.

Gomberg also laid the foundations for a causal theory of accounting: in the same way that any kind of movement must have a starting and ending point so must also the movements of accounting values in a company have an initial and final point. Thus the credit side becomes the exit side and the debit side symbolises the entry side of an account. Every recording of a business transaction is, therefore, a value exit in an account and an equivalent accrual of value in another account since, according to the causal principle, that cause is always a value exit which is recorded in the credit side of an account whereas the result of a business transaction signifies always a value exit which is the debit of another account. Upon this line of reasoning Gomberg (and later Delaporte and his other followers) groups the results of business events in accounts according to their cause and effect. He sees accounts as expressing values only (*comptes de valeurs*)³² and Debit = Entry and Credit = Exit has a different meaning for every account.³³ The basis of double entry systems is the presentation of the circulation of accounting values (*Wertekreislauf*) which is not the same as the circulation of capital as Biedermann and other of Gomberg's contemporaries had been arguing.³⁴

When credits are symbolised as + and debits as -, the following rule is applied upon positive (asset) accounts and negative (liabilities) accounts:

$$\begin{array}{c|c} (+) & \\ \hline + & - \end{array} \qquad \begin{array}{c|c} (-) & \\ \hline + & + \end{array}$$

³²Rene Delaporte has elaborated further and refined these views. See his book *Méthode rationnelle de la tenue des comptes*, Paris, 1936, p. 251.

³³Léon Gomberg, *La science de la comptabilité et son système scientifique*, Paris-Geneva, 1897, pp. 73-74.

³⁴Léon Gomberg, *Grundlegung der Verrechnungswissenschaft*, Leipzig, 1908, p. 159. Rene Delaporte, *op. cit.*, pp. 37, 42.

³⁰August Comte is the first person to use the term dynamic in this context in his *Political Economy*.

³¹See above.

Table 1

Statistical Results	Assets	Decrease from transactions in property on its assets side
		Increase from transactions in property on its assets side
	Liabilities	Decrease from transactions in property on its liabilities side
		Increase from transactions in property on its liabilities side
Legalistic Results	Accounts Receivable	Generation (increase) of a claim Redemption—amortisation (decrease) of a claim
	Debts	Generation (increase) of a debt Redemption—amortisation (decrease) of a debt
Economic Results	Losses	Generation (increase) of losses Decrease of losses
	Profits	Generation (increase) of profits Decrease of profits
	Capital	Invested capital (increase) Disinvested capital (decrease)

The effects that can be exerted mathematically upon these two accounts are

$$\begin{array}{c|c} (+) & (-) \\ \hline + (+) & - (-) \\ - (-) & + (+) \end{array}$$

Gomberg attempted to arrange the results of business operations in homogeneous groups of accounts.³⁵

From there Gomberg draws his entire book keeping system which, strictly speaking, is sufficiently described by three sets of accounts. There would be one set for the statistical results, a second for the legalistic results and a third one for the economic results:

These three accounts would give the information about all the results of (corporate) economic activity and make it possible to get answers about the three questions on the changes and the status of the assets (the first accounts), and debts and the claims upon sundry debtors (the second account) and the economic results (the third account).³⁶

Gomberg's double entry system could be summarised as follows.

Statistic Accounts		Legalistic Accounts	
+	-	+	-
Assets	Liabilities	Claims	Debts

Economic Accounts	
+	-
Loss	Profit Capital

In his earlier work of 1897, *La science de la comptabilité*..., Gomberg described business activities as being reflected adequately in only two groups of accounts, namely in *actions statistiques* and *actions économiques* (p. 79). His separation of the legalistic events from the statistical ones resulted later.

On the grounds that cost of goods purchased shows their value in a more stable way over time, Gomberg proposed the use of acquisition costs in calculating results as well as the closing balance sheet:³⁷ *Le frais constituent une valeur comme tous*

³⁵Léon Gomberg, *Eine geometrische Darstellung der Buchhaltungsmethode*, in *Annalen der Betriebswirtschaft*, Bd. 1, Heft 1, 1927, p. 102.

³⁶Léon Gomberg, *Eine geometrische Darstellung*, p. 109.

³⁷That is why he speaks about stable value accounts (*Wertbestand Kosten*): Léon Gomberg, *La science de la comptabilité et son système scientifique*, p. 87.

les objects concrets

Since any value movement has to appear in a causal account, Gomberg's theory accounts also for one-side changes in the book value of assets and records their causes in separate causal accounts which at the end of the year are grouped in the corresponding results account.

Sombart quoted Gomberg, in order to stress the importance of book-keeping in knowing not only how a business stands but also in making possible the employment of rationally derived plans for extending future operations or predict-

ing the course of present actions and decisions (see W. Sombart's *Das Moderne Kapitalismus*, II, p. 121, 6th edn. 1924):

The importance of book-keeping lies not only in the study of the past activities of an enterprise, but also in the indications which it furnishes for future direction. From the observation and study of events that are over it provides the possibility of forejudging future activity and finding sure bases for reasoning out the actions to come.

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Accounting for Monetary Items Under CCA¹

R. W. Gibson

Introduction

It is hardly necessary to document the proof that inflation will rob a net-asset-holding entity of real economic power unless there is some offsetting increase in the total aggregate of the resources commanded by such an entity. There is no greater need to prove also that a debtor will need to apply a diminishing portion of a given pool of real resources to repay liabilities in the future if those liabilities are expressed as fixed money amounts rather than being linked to some measure of real economic value. Many non-monetary assets will increase in price at a rate at least equal to or greater than the average change in prices. Traditionally it has been argued that in part interest is received as an offset to any inflationary effects. Such an offset is missing where the inflation rate is higher than the interest rate or where resources are held in a monetary form which does not earn interest. The reasonable man in the street is aware that cash balances during an inflationary period will progressively command fewer economic goods unless converted into an interest bearing form to earn a return at least equal to the rate of inflation. The reasonable man in the street is also aware that if his non-monetary assets and/or his sources of income increase in dollar amount due to inflation it will require a diminishing proportion of those resources to repay liabilities expressed in fixed money amounts. The recognition of these economic realities likewise suggests that an adequate system of accounting will incorporate measures of such gains and losses arising from holding monetary assets and liabilities as well as those arising from non-monetary items.

The Australian accountancy profession has attempted to meet the challenge of accounting in times of changing prices by proposing the introduction of a particular form of CVA embodied in

the Provisional Standard DPS1.1 and its later amended version DPS1.1A. DPS1.1 did not attempt to deal with the problem of monetary assets and liabilities. Proposals have been put forward as an Exposure Draft, EDMR, and a revised Exposure Draft issued in August 1979. The several alternative treatments possible are outlined herein and it is then argued that the choices made in the original EDMR and the revised EDMR are inappropriate solutions for public companies listed on the stock exchanges or for any public decision making process such as protective import tariff determination or wage fixing. In view of the possibility of EDMR or the Revised EDMR becoming an accounting standard a number of practical aspects of implementing these proposals are discussed.

Effect of price changes on monetary items

The CCA system as proposed in DPS1.1 is clearly designed to deal with changes in the prices of certain specified assets (par. 3.10). There is no mention in DPS1.1 of the problem of changes in the general price level as reflected in a changing unit of measurement. Changes in specific prices of non-monetary assets will indirectly affect the net monetary asset holdings of an entity, e.g. an increase in prices of inventory holdings may lead to an increase in bank overdraft to sustain a constant physical level of inventory. Nevertheless the principal factor involved with the impact of inflation on monetary items is the change in the general level of prices because it is this change which alters the real economic significance of *all* monetary contractual relationships expressed in fixed money amounts. Furthermore, most monetary resources are held in assets which are not subject to market-determined specific identifiable price changes. The extension of the Australian CCA system to incorporate the revised EDMR is in part an extension to introduce an element of recognition of general price change.

¹A number of organisations and documents are referred to by abbreviated symbols. These are set out in the glossary for the benefit of readers.



The Australian Proposals

The recognition that gains and losses on holding monetary resources are possible is a relatively simple matter. A more complex issue is to define what constitutes such a gain or loss. Within the system of CCA proposed in DPS1.1, profit cannot arise until the operating capability of the entity has been maintained. EDMR proposed that a similar entity concept should be applied to the maintenance of monetary working capital so that a loss is defined as arising when operating capability is impaired by virtue of a loss of specific purchasing power due to a relevant specific price increase and vice versa for losses (par. 10). Where a specific index of prices is unavailable, resort will be had to a general index. EDMR proposed that gains or losses on holding monetary working capital and long term monetary assets should be separately disclosed as an item in the profit and loss statement with an offsetting item against the current cost adjustment account (par. 44–50). The revised EDMR now proposes the proprietary viewpoint that in addition to recognising the effect of price changes on monetary working capital and long term monetary assets the CCA system should be extended to permit reporting to take into account also the offsetting gains accruing to shareholders arising from the repayment of long term debt in the contracted number of dollars. This permits the presentation of both viewpoints without rejecting the alternative of excluding such gains from reported profits. The revised EDMR requires the profit and loss statement to include the effect of gains or losses on holding all monetary assets and liabilities. Any gains on loan capital are offset by a credit to a gearing gains reserve account so that the profit and gearing gains attributable to shareholders are converted to the entity net profit.

Public Reaction to the Australian Proposals

When the Provisional Standard DPS1.1 was first issued in October 1976 it provoked considerable public discussion over a wide range of issues.² Nevertheless there was less discussion of the omission of any recommendation on monetary resources than might have been expected. DPS1.2 observed that 'This matter requires considerable further research, including adequate field testing, before any decision can be made as to the most appropriate accounting treatment'

(par. 12.24). Subsequently, DPS1.2A has noted that 'it is now believed that the concepts underlying CCA require the recognition...' of gains and losses on monetary resources (par. 12.24). The public discussion as typified by the Melbourne press was very limited in the light of the acknowledged difficulty of the subject. Perhaps the most cogent comment publicly expressed in the press on DPS1.1 was Barrie Dunstan's comment in *The Herald*. After noting that it 'left to one side the effect on profits of gains or losses on monetary items' he suggested:

... a cynic—or a left-wing union leader—could argue that CCA is concentrating on reducing company profits without allowing for offsetting monetary item gains.³

Anthony Clark in *The Age* took up the case on behalf of the banks in particular, claiming that the proposals 'discriminate heavily against financial bodies such as banks'⁴ because of the failure to deal with the issue of monetary assets and liabilities. Dr. Jim Everett in *The Herald*, after pointing out the potential policy implications of DPS1.1 and the apparently overlooked offsetting advantages of debt in an inflationary period, proposed that 'perhaps we should pause before we let the CCA results influence policy.'⁵ John Bailey argued in *The Herald* that investors understood the reality of inflation and that bankers far from being fooled saw the inflation of the market value against disclosed book values of assets pledged as security to be 'giving greater security for their loans' which remain as fixed dollar amounts.⁶ Pointed as these remarks might be judged, an analysis of the number of column inches of material in the major dailies showed that they represented barely 3% of the comment on CCA published over the period. Although the public discussion was limited it did identify the treatment of monetary resources as an important unresolved issue.

Alternative treatments

At the time when the provisional standard was issued it was recognised that: such gains and losses could be completely ignored; all such gains and losses could be brought to account; or such

²R. W. Gibson (ed.), *Accountancy and the Press, The Provisional Accounting Standard, Current Cost Accounting*, Deakin University, Geelong, 1977.

³Barrie Dunstan, 'Tax is Key to CCA Switch', *The Herald*, 14 October 1976.

⁴Anthony Clarke, 'CCA: Away Go the Opening Salvos', *The Age*, 9 November 1976.

⁵J. Everett, 'Too Distorting, The CCA Debate', *The Herald*, 6 December 1976.

⁶John L. Bailey, 'CCA Will Reveal Pitfalls, The CCA Debate', *The Herald*, 9 December 1976.

gains and losses could be brought to account only to the extent they relate to items forming part of the working capital.⁷ This analysis of available options may be extended by identifying other possibilities within the limits of the extremes. Henderson and Peirson refined these alternatives by identifying three variations within these limits to give the following possibilities:

- (a) including losses on all monetary assets;
- (b) including losses on current monetary assets while excluding losses on fixed or long term monetary assets;
- (c) including losses on all monetary assets and gains on current monetary liabilities;
- (d) including losses on all monetary assets and gains on all monetary liabilities.
- (e) including none of the gains or losses on monetary items.⁸

Effectively the original EDMR was based on alternative (c) while revised EDMR has given some recognition to alternative (d). Before considering the Australian proposals in detail it is intended to review the other alternatives. This review progresses by identifying progressively the arguments for including a wider range of losses on monetary assets followed by inclusion of a widening range of gains on liabilities.

Alternative (e)⁹—Including None of the Gains or Losses on Monetary Items

This alternative amounts to rejecting any attempt to deal with the issues. The operating capability to be maintained is effectively restricted to those physical assets for which the historical costs are subject to adjustment to current costs under CCA (DPS1.1, par. 3.10). As Henderson and Peirson note, this is an unduly restrictive view. Normal commercial practice would regard some element of working capital as an essential ingredient in the structure of a business entity—even in the extreme case of regular negative working capital. It is therefore easy to reject this alternative as being too restrictive in its coverage without necessarily resolving just how much more comprehensive an acceptable scheme would be.

Alternative (b)¹⁰—Including Losses on Current Monetary Assets While Excluding Losses on Fixed or Long Term Monetary Assets

This approach is the next closest to totally

ignoring the problem. It attempts to divide monetary assets into short and long term and thereby recognise losses on one group of monetary assets while ignoring losses on the other. This amounts to accepting that the operating capability to be maintained includes those monetary assets classified as current while excluding those classified as long term. In one sense the Richardson Committee¹¹ in New Zealand adopted this alternative by arguing that losses on monetary assets necessary to maintain the entity's operating capability should be a charge to profit and loss but that this should not apply to monetary assets put aside for speculative purposes not directly related to the entity's normal activities.

The UK Accounting Standards Committee in SSAP16 includes adjustments for current monetary assets and liabilities together with a system of abatement of the current cost adjustments according to the extent to which the shareholders' funds are subject to gearing or leverage. Thus while the UK proposals commence with alternative (b) the end result is closest to alternative (d) of the alternatives discussed herein.

There is no more sense in asserting that losses on some monetary assets may be ignored than to assert, as in the previous alternative discussed, that all such losses may be ignored. It is possible to rationalise this proposal by defining long term monetary assets as having special characteristics and logically adapting the rest of the CCA proposal. Thus it could be argued that it does not matter that resources invested in debentures will not be maintained in real terms because the legal framework only requires ultimate repayment in terms of the contractual money sum. However, consider the case of an insurance company providing personal injury cover. In such a case there is an average minimum period of 4 years between writing the policy and settlement of claims. Because claims are settled at wage and price levels at the date of settlement the insurer would much prefer to recover funds invested out of premium income in real terms. At present the insurer's pay out is effectively indexed but the invested funds are returned in original money amount plus an interest rate which may well be less than the percentage change in general price levels. The NZ Richardson Committee approach does not overcome the problem but simply shifts the basis of discrimination to the supposed purpose of holding the assets instead of the nature of the asset

⁷DPS1.2, par. 12.23.

⁸M. S. Henderson & C. G. Peirson, *CCA and Purchasing Power Gains and Losses on Monetary Items*, AARF, Melbourne, August 1977.

⁹*Ibid*, p. 32.

¹⁰*Ibid*, p. 27.

¹¹New Zealand, *Report of the Committee of Enquiry into Inflation Accounting*, Government Printer, Wellington, 1976, par. 18.11.

itself. It does not seem logical to modify the method of accounting for assets according to the purpose for which the assets are held.

Any generally applicable accounting system ought to be neutral as to its consequences whether applied to debtors or creditors. A system which required some entities to account for losses on long term monetary assets to be logically consistent should therefore require the other party to the transaction to account similarly for long term monetary liabilities. The failure to do so ignores the obvious economic advantage of repaying liabilities in constant money amounts in the face of inflation of the general price level. This alternative therefore deserves to be rejected.

Alternative (a)¹²—Including Losses on All Monetary Assets

In one sense this alternative is the complement of the two discussed above. The proposition that losses on all monetary assets should be recognised is eminently consistent with the fundamental viewpoint of DPS1.1. It amounts to an acceptance of the view that the operating capability to be maintained involves all of the assets of the entity. It would appear that this is the primary reason for Henderson and Peirson advocating the adoption of this alternative.¹³ The difficulty with accepting this alternative is a deficiency already shown to exist with alternative (b), i.e. the total exclusion of the possibility of any offsetting benefit arising from the existence of monetary liabilities. It also fails to be neutral as between debtors and creditors and requires alternative treatments of the two sides of the same economic event. It can also be rejected as failing to resolve the problems involved.

Alternative (c)¹⁴—Including Losses on All Monetary Assets and Gains on Current Monetary Liabilities

Subject to resolution of the definitional boundaries this can be said to be the alternative adopted in EDMR and its application is considered in more detail later. As with alternative (a), it is consistent with DPS1.1 in recognising that the maintenance of operating capability requires the recognition of losses on all types of asset holdings. Because of the emphasis placed on the maintenance of assets it has become identified as the entity approach. There is also, however, an

inconsistency in the recognition that some liabilities may give rise to benefits while others will not do so. As with alternative (b), this approach fails to be neutral as between its application to debtors and creditors because of the arbitrary division of liabilities into current and non-current independently of the treatment of assets. With particular reference to liabilities it can be said that this alternative fails to be neutral as between different debt/equity financial structures. It is argued in detail later that it is reasonable to expect the CCA model to take account of such fundamental structural features of the business entity. This alternative is rejected as it would also fail to resolve the issues of dealing with monetary items.

Alternative (d)¹⁵—Including Losses on All Monetary Assets and Gains on All Monetary Liabilities

This alternative recognises the inflationary impact on all liabilities and therefore emphasises the net assets of the entity and has become identified as the proprietary approach. In addition to accepting the recognition of gains on short term liabilities, it also requires the recognition of gains on long term liabilities. It involves an acceptance of the acknowledged role of debt as a hedge against inflation unless society decides to alter the basis of such financial contracts by indexing all long term contracts. This alternative has been recognised by the revised EDMR in so far as it requires the inclusion in the profit and loss calculation and reports of an intermediate figure based on this proprietary viewpoint.

Unlike the alternatives analysed above, this alternative is neutral as between debtors and creditors and as between different financial structures because of its all inclusive coverage. It therefore commands support because the results of its application will be independent of other extraneous factors and problems of definition involved in those alternatives requiring a division of monetary liabilities and/or monetary assets.

Financial effects

Calculations of the effects of some of these alternatives have been made for 70 Australian companies by the AARF. The resulting data have been used by Henderson and Peirson whose conclusions may be summarised as follows. Initially

¹²Henderson and Peirson, *op. cit.*, p. 25.

¹³*Ibid.*, p. 51.

¹⁴*Ibid.*, p. 29.

¹⁵*Ibid.*, p. 32.

concentrating on the maintenance of all assets they conclude:

... as losses on monetary assets for this sample exceed 10% of the reported profits they are material in terms of the Australian materiality guidelines as set out in DS7.¹⁶

They then consider the exclusion of long term monetary assets and conclude:

The exclusion of the \$53 million purchasing power loss on the long term monetary assets of the 70 companies makes little difference to the materiality of the result. The purchasing power loss on short term monetary assets is material.¹⁷

They next additionally isolate the effect of long term monetary liabilities and find:

In aggregate the materiality of purchasing power gains and losses on net monetary items excluding long term debt is not as clear as in the two previous cases. For some companies, they may be clearly material but for others they may be insignificant.¹⁸

Finally they consider the more restrictive position of maintaining the physical assets and net monetary items and find:

... in the aggregate, purchasing power gains and losses on net monetary items for the 70 companies in the survey were material.¹⁹

The above conclusions demonstrate that four different methods of recognition almost always produce significant results. This suggests that the inclusion of gains and losses on holding monetary resources may be expected materially to alter reported profits whatever form of adjustment is ultimately agreed upon. The possibility of material variations arising under such a diversity of assumptions lends support to the necessity to determine the correct approach to making such adjustments in any comprehensive system of CVA.

The case against EDMR

The two alternative treatments of gains and losses on monetary assets and liabilities recognised by EDMR and the revised EDMR may now be examined in the light of the above outline of the

alternatives. This analysis will also demonstrate why it is considered that the original proposal based on alternative (c) in EDMR is not appropriate for purposes such as reporting by public companies listed on the stock exchange, protective tariff assessment, wage fixing etc., unless there is a fundamental change in the organisation of commercial financial arrangements in Australia.

Capital Maintenance and Income Concept

To rationalise the recognition of losses on all monetary assets and gains only on current monetary liabilities as proposed in EDMR, it is necessary to identify how the necessary particular viewpoint of the company is established as within the CCA proposals. It is not expressly stated in DPS1.1 that it incorporates a particular view of capital maintenance but it is indirectly implied by the income concept incorporated in the provisional standard. Par. 3.04 makes it clear the overriding premise is that non-monetary assets should be stated at current cost and together with par. 3.10 that the current cost should be recovered before it can be said that a profit has been earned. Considering the importance and potential impact on accountancy and the role of financial statements of the capital maintenance concept, it is surprising that it is not found in the provisional standard DPS1.1, but is to be found in the explanatory statement DPS1.2 at par. 12.02 which defines income as what could be distributed while maintaining capital. Capital is in turn defined as operating capability (par. 12.05). This operating capability is said in DPS1.2 rarely to be capable of exact quantification (par. 12.04) and is defined as 'the ability of the entity, at a given time, to provide goods and/or services in accordance with its then existing resources' (par. 11.01). These definitions are taken as incorporating in DPS1.1 an entity viewpoint so that cost recovery is directed at maintaining intact the total capacity of the entity regardless of the source of finance. This entity viewpoint is carried into the exposure draft, EDMR, in more explicit terms than in either DPS1.1 or DPS1.2. Thus in par. 3 we read:

The entity is viewed as an economic unit which raises and accumulates funds so as to acquire resources. These resources, which may be monetary or non-monetary in nature, provide the entity with operating capability.

The exposure draft is not content with stating this fundamental viewpoint but in a rather veiled way spells out the rejection of a proprietary view of

¹⁶*Ibid*, p. 38.

¹⁷*Ibid*, p. 41.

¹⁸*Ibid*.

¹⁹*Ibid*, p. 42.

hedging against inflation by using borrowed capital by noting that:

... because capital, under CCA, [and we might add as defined in DPS1.1A] is understood to be the operating capability provided by the resources (assets) of the entity, gains or losses on holding monetary items can only occur in relation to monetary resources, and cannot occur in relation to funds employed which support resources (par. 5).

This fundamental entity viewpoint has an immediate implication for the treatment of long term monetary liabilities which remain expressed in the contractual dollar amounts. The resources represented by the long term liabilities, it is asserted, constitute part of the operating capability of the entity. The adoption of the entity viewpoint therefore leads to the rejection of the concept of benefits to the contributors of long term risk or ownership capital arising from the terms of repayment of long term liabilities. This in turn requires the introduction of a definition to distinguish between monetary and non-monetary liabilities. The definition could well be said to be 'void as to uncertainty' because of the subjective element involved in determining which classes of liabilities are long term (regardless of normal balance sheet classification) and which are short term but involving roll-over facilities. The weakness of this definition and the EDMR proposal is apparent when the routine roll-over nature of all creditors arising in the ordinary course of business is considered.

Creditors' Rights

The artificiality of the denial of any potential gain from using long term debt is apparent when one considers the consequences of indexed rights for creditors without necessarily advocating their introduction. If such rights existed it would be necessary to maintain the equivalent real assets because on repayment there would be an obligation to repay in real terms rather than original contracted dollar amounts. In the absence of such rights for creditors, why should the entity claim the right to maintain the equivalent assets in real terms and retain for the entity the difference between the equivalent in real economic terms of the original money amount contracted and the final payment to creditors, while at the same time denying that it had gained an advantage because creditors remain only entitled to claim the original money amounts of dollars as expressed in the original obligations? EDMR does not deny the

possibility of such gains (e.g. see par. 19) but rather excludes accounting for them on the grounds of the entity viewpoint adopted. The realisation of the potential gain on long term debt may well involve repayment followed by refinancing of the debt at the increased money amount needed to sustain the same level of activity. Such refinancing does not invalidate the existence of such gains even if the entity is thereby encouraged to seek extension of existing loans instead of repayment and fresh borrowings. The nature of the legal contractual relationship between lenders and borrowers contradicts the capital maintenance concept of the entity approach.

Nature of Company Entity

It is true that in Australia the corporation is a separate legal person created by the law and able to sue and be sued in a court of law, to possess real and personal assets and even to be guilty of a crime requiring it to have a guilty mind. However, although it possesses all these attributes it is not created to be an end in itself even though some boards of directors and managers may appear to assume the contrary. The socio-economic role of a company may be demonstrated by recalling that it is a derivative of the legal concept of a trust. Indeed early companies in Australia were usually created by Deed of Settlement with the directors as trustees for the shareholders. The company exists primarily for the shareholders and it is the maintenance of the capital contributed by those shareholders which has lain at the heart of such court actions as have occurred over the availability of profits to be paid out as dividends. The statutory requirement that dividends must not be paid out of capital is concerned with preserving the shareholders' capital as a protection to the rights of creditors. There is no statutory provision which obliges managers to maintain capital expressed as some measure of total assets rather than shareholders' funds.

The trust character of a company implies a degree of responsibility towards other 'beneficiaries' of the company including debenture holders and other creditors. If the concept in Australian law of reporting a true and fair profit reflects the traditional trustee requirement of equity between corpus and income it may also be said to imply equity between different classes of investor with a claim on either capital or income. In respect to the public investor financed company whose shares are traded on the stock exchanges—or other forms of securities markets in countries where they exist—the question of equity

between classes of investors becomes a matter of public policy to be resolved by Parliament rather than by the issue of an accounting standard by the accounting profession. Traditional interpretations of company law would appear to support the proprietary viewpoint. Modern social conditions would justify an extension of this to cover other interested parties such as employees and customers. These groups other than shareholders may rightly argue that regardless of the identity of shareholders it is inequitable that shareholders should be the eventual rightful and lawful beneficiaries of a scheme which preserves the total assets of the company in real terms but denies any participation in the results of such a scheme by the other 'beneficiaries' of the company as in EDMR.

Pricing and Revenue

In a period of continuing inflation it may be reasonably assumed that a scheme designed to maintain the total assets of a company in real terms while continuing to discharge liabilities in money terms would require higher revenue to produce a profit than would be the case if either the benefit of repaying liabilities in money of lowered real value was recognised or alternatively the maintenance of assets in real terms was confined to those assets (or the proportion of total assets) financed by the shareholders. The policy of maintaining out of revenue all assets in real terms will therefore lead to higher prices or lower returns to other factors of production including labour than would be the case in the alternative situations. Estimates such as those used by Henderson and Peirson²⁰ and those prepared by Davidson and Everett²¹ demonstrate the potential magnitude of the difference in profit likely to arise from the recognition of gains and losses on monetary assets and liabilities and the consequent effect on revenue necessary to produce a real profit. There is a potential for companies to seek to increase revenue to cover the additional 'costs' involved while other parties will not have similar opportunities to protect their economic position. The proposal in EDMR must therefore be objected to as inequitable for all companies involved in procedures to determine fair prices, protective tariffs, wage fixation and the like where the interests of consumers, employees etc., must be considered.

Within the existing political-economic-social order there is only a limited recognition of the right to protection against the ravages of inflation. Two examples may be cited. Australian wage fixing tribunals have generally acknowledged claims directed at maintaining the real economic level of existing awards even if not always granting an adjustment for the total estimated change in prices. The Australian Prices Justification Tribunal and other price fixing authorities have usually accepted the case for price rises to cover cost increases arising from price inflation.

Realisation of Gains

The relevant increases in resources to maintain operating capability of the total assets will be accounted for under the combination of DPS1.1A and EDMR regardless of the question as to when the debt involved may be repaid. In fact it is part of the argument of the proponents of the EDMR proposals that they do not anticipate any repayment at all and hence claim a gain cannot therefore arise. This is not grounds on which to say a profit has not been earned. There is an increase in resources which will not be needed to meet the ultimate repayment. What is involved is the usual distinction between the recognition of a gain and its realisation in an accounting sense. EDMR asks the rhetorical question: how is it that a gain or loss can occur in respect of trade creditors, but not in respect of loan capital (par. 21)? It is asserted in EDMR that this is because of some unique attribute of working capital. If a similar 'roll over' were set out for long term debt there would equally be a demonstrable gain. The issue with long term debt is therefore one of timing the recognition of the gain. There may be some doubt about when the inflationary gain on long term liabilities may be recognised. An extreme view would be to delay it in all circumstances until final repayment had been made to the creditors. On the other hand if the AAA definition of realisation²² as expounded by Windal²³ is adopted it may well be that the appropriate tests of permanence and objectivity may be satisfied at a much earlier date. The architects of EDMR have rejected these considerations and insist that it is

²⁰*Ibid*, pp. 37-43.

²¹J. E. Everett, 'CCA Confusing on Company Results', *Rydges*, May 1977, p. 47 and J. E. Everett and A. G. Davison, 'CCA—Half True or Wholly Misleading?', *Australian Accountant*, June, 1977, pp. 305-312.

²²American Accounting Association, *Accounting and Reporting Standards for Corporate Financial Statements and Preceding Statements and Supplements*, Columbus, Ohio, 1957, p. 3.

²³Floyd W. Windal, *The Accounting Concept of Realization*, Occasional Paper No. 5, Bureau of Business and Economic Research, Michigan State University, East Lansing, Mich., 1961 and 'The Accounting Concept of Realization', *Accounting Review*, April 1961, p. 251.

the maintenance of the total assets of the company in real terms which is necessary and have devised EDMR on that basis. The possibility that some loan capital may exist for as far into the future as can be predicted does not alter the nature and social role of the company nor can it equally deny that the creditor has as much right to be repaid in real terms as the shareholder has to see his capital maintained in real terms.

Debt/Equity Financing

The proprietary viewpoint does raise the apparent difficulty that the reported profit will vary according to the reliance placed on debt by the company. An argument may be presented that the reported profit should be independent of the method of financing the entity and therefore should not be influenced by the existence or otherwise of long term debt. This is a reflection of the famous Durand thesis on the valuation of the firm which rests on the assumption, either explicit or implicit, that the firm remains the same firm with or without debt and would be valued the same regardless of its capital structure. Such assumptions are unreal and hence the conclusion fails to reflect reality. There is no reason why the reported profit and the valuation of the entity should not vary due to there being varying amounts of long term debt. It can be demonstrated that the use of debt changes the nature of the firm because of the addition of such factors as the risk of bankruptcy due to default on loan payments.²⁴ The entity which incurs long term monetary liabilities is a different entity from one which fails to do so and hence may well be differently valued. One of those differences is the opportunity of enhanced returns to owners (shareholders in companies) which is an offset to the absence of rights, to maintain and ultimately to repay the capital contributed by long term liabilities other than in money terms. One of the major objectives of any system of current value accounting should be so to neutralise the effects of inflation as to eliminate distortions due to inflation from the financial statements. In the absence of inflation it could be expected that entities would maintain relatively consistent debt/equity ratios. The proposals in EDMR would, all other things being equal, on the contrary lead to a consistent reduction in the debt/equity ratio. This would occur as the obligations to creditors remain con-

stant in dollars while the real resources represent increasing aggregates in dollars. The proprietary viewpoint would not have this result and would neutralise the inflation consequence referred to. The revised EDMR has recognised the point of this argument by providing for the reporting to include the result from a proprietary viewpoint.

The case for the revised EDMR

It is clear that there were many submissions made which were critical of EDMR taking the entity viewpoint solely. While there is little evidence to suggest that the proponents of the entity alternative have changed their views, the circumstances have now permitted the introduction into the revised EDMR of some recognition of the proprietary alternative as an intermediate step towards determining and reporting the entity profit. These changes recognise the objections set out above and represent the adoption of alternative (d) within the overall scheme of the revised EDMR. We have argued for the proprietary viewpoint and therefore support the revised EDMR to the extent that it has afforded some recognition to this alternative.

Problems of Implementation

Whether the revised EDMR or a further revision involving the proprietary viewpoint alone becomes an accounting standard there are some practical questions of implementation.

Choice of Index

The recognition of gains and losses on monetary resources is essentially accounting for inflation in the wider sense rather than accounting for price changes of specific assets. Therefore the question arises as to what index is appropriate to use in the measurement process. One view is that money is a general commodity and that the appropriate measure of change should be widely based. Options available include the consumer price index and the calculated gross national product implicit deflator (GNPID).²⁵ Selection of one of these indices has the advantage that all entities would be accounted for on a uniform basis so far as monetary resources are concerned. The major objection rests on the capital maintenance concept implicit in DPS1.1. Thus it could be that some entities may use monetary resources in

²⁴For a discussion of the history of these propositions see R. W. Gibson, 'Reconciling Cost of Capital Theories', *Accounting Education*, May 1976, pp. 18-32.

²⁵ASA and ICAA, *Preliminary Exposure Draft, A Method of Accounting for Changes in the Purchasing Power of Money*, Melbourne, 1974.

financing debtors in a particular line of business where the price of commodities, and hence for a given level of activity the amount of receivables, changes quite differently to the general price level. In such circumstances there would not be a maintenance of productive capacity unless the relevant level of receivables could be financed without seeking further outside finance.

The alternative view is that a specific index should be used by each entity reflecting the movement of prices in that industry. This would overcome the problem outlined above but at the price of adding further subjectivity to accounting. The results may sometimes seem perverse because the measurement depends on the type of business engaged in. Wright illustrated this perverse result by contrasting the position of a company financing spirit traders when the government's annual budget raised the excise on liquor with the parallel case of a company financing motor car traders when the same budget significantly reduced the level of sales tax on automobiles.²⁶ The revised EDMR has come down on the side of specific indices (pars. 30-33, 45-46) which is consistent with the emphasis on specific asset prices in DPS1.1.

Distributable Surplus

Difficulties arise in the practical justification of the proposals where there is no apparent distributable surplus reflecting the gains made. In an extreme case of a trader fully financing inventory by use of creditor finance, the gains arising from repaying the creditor on a regular basis the original money sum may be just sufficient to provide the resources to maintain a constant physical inventory without increasing the price to the consumer by more than the actual dollar increase. More usually, however, it is simply another case of separating the process of profit measurement from the resource allocation actions of the entity. Where a company is a net debtor to other companies, it is no less able to make a profit by paying off debts with inflation affected dollars. The distinction is that the company will be financially better off than it would have otherwise been notwithstanding the absence of a cash balance. Profitable companies without any cash surplus are by no means a new phenomenon. Financial policies should not be confused with accounting measurement.

One commentator has suggested that the use of

creditor finance is not a gain as such, but rather a means of avoiding a cost recorded in accordance with DPS1.1.

When an increase in specific input prices occurs, CCA requires a revaluation of inventories, with the amount of the revaluation being taken to a 'Current Cost Adjustment Account', a non-distributable part of shareholders' funds. The objective is to ensure that the distributable part of the profit made when the inventory is subsequently sold excludes the inventory holding gain, which is retained to provide for replacement. However, when the replacement of inventory occurs on a credit basis, it may be said the suppliers are financing the replacement, and therefore Operating Capability maintenance retention is achieved through increasing short-term trade creditors, assuming that the timing of the supplier-provided financing is at least as long as the inventory replenishment cycle. It follows that the original retention for operating capability maintenance retention purposes was not necessary. Thus, it is not that the entity has made a 'gain' by having net liabilities but rather that by financing replacement through an increase in short-term trade creditors it has avoided the immediate need for an operating capability maintenance retention.²⁷

Does it matter? The net result will be the same but the gross expenses and gross gains will both be stated by an equal lesser sum.

The proposals imply that the gain on creditors constituting part of monetary working capital may be regarded as fully realised. There may be circumstances in which this assumption cannot be sustained. One such case would be where an entity is chronically in debt and where there may be doubts of the capacity of the entity to realise the benefit by ever repaying what may have become a permanent debt. This is comparable to the position of inflationary gains accruing to shareholders arising from outstanding long term debt and should be dealt with in the same way.

Foreign Currency Transactions

The definitions of monetary assets and monetary liabilities used allow for the inclusion of amounts expressed in other currencies than Australian dollars. Before such amounts can be aggre-

²⁶F. K. Wright, oral remarks at an ICAA Lecture, 26 September, 1978.

²⁷Letter from C. E. Caldwell, Cadbury Schweppes Pty. Ltd., to Australian Accounting Research Foundation, 31 July 1978.

gated they must be translated into Australian currency. The change in the economic value to an owner or creditor of such foreign currency assets and liabilities is affected by exchange fluctuations in a manner exactly similar to the effect of price fluctuations over time in one country. However it is not intended to consider this aspect further in this context.

Whither Australian proposals now?

In due course the Australian accountancy profession will have to make a more deliberate choice between the entity and proprietary viewpoints of the treatment of gains and losses on monetary assets and liabilities. The issue of the revised Exposure Draft follows widespread discussion within the profession which indicated that the proposals in EDMR would be soundly rejected when all the interested and affected parties fully realised the implications of the CCA proposals of DPS1.1 and DPS1.1A combined with EDMR.

The trend of some overseas developments suggests that the pressure of worldwide opinion may well be marshalled in support of the proprietary viewpoint. For example the FASB Exposure Draft *Financial Reporting and Changing Prices* asserted:

... a large amount of long-term debt will cause a large gain of purchasing power in periods of inflation ...²⁸

and, after distinguishing between the maintenance of productive capacity (entity viewpoint) and the maintenance of the net assets which it refers to as financial capital (proprietary viewpoint), stated:

The Board has concluded that the financial capital concept is the more useful, and it is adopted in this Statement.²⁹

The FASB subsequently approved a proposal designed to allow considerable experimentation

including the proprietary viewpoint.³⁰ As already noted, the UK SSAP16 includes a gearing adjustment which leads to results more nearly approximating the proprietary viewpoint than the other alternatives outlined earlier.

The Australian situation has now developed to the stage where the combined effect of the Provisional Standard and the revised Exposure Draft is to require companies to report on both an entity and proprietary viewpoint. Whether such an ambivalent position can be sustained only time will tell. The changes reflected in the revised Exposure Draft may well be carried further with the ultimate result that the proprietary viewpoint becomes pre-eminent. That would bring the proposed accounting standards into line with the case argued herein.

Glossary of Terms and Abbreviations

AAA	American Accounting Association
AARF	Australian Accounting Research Foundation
CCA	Current Cost Accounting
CVA	Current Value Accounting
DPS1.1	Australian Accounting Standards Committee, <i>Current Cost Accounting, Statement of Provisional Accounting Standard, DPS1.1</i> , October 1976
DPS1.1A	—, Amended, August, 1978
DPS1.2	—, <i>The Basis of Current Cost Accounting, Explanatory Statement DPS1.2</i> , October 1976
DPS1.2A	—, Amended, August, 1978
EDMR	Australian Accounting Research Foundation, <i>Exposure Draft, The Recognition of Gains and Losses on Holding Monetary Resources in the Context of Current Cost Accounting</i> , Melbourne, July 1978
FASB	Financial Accounting Standards Board
Revised EDMR	Australian Accounting Research Foundation, <i>Revised Exposure Draft, The Recognition of Gains and Losses on Holding Monetary Items in the Context of Current Cost Accounting</i> , Melbourne, August 1979

²⁸Financial Accounting Standards Board, *Exposure Draft Financial Reporting and Changing Prices*, Stamford Conn., 1979, p. 39.

²⁹*Ibid*, p. 3.

³⁰*Ibid*, *Statement of Financial Accounting Standard No. 33, Financial Reporting and Changing Prices*, Stamford Conn., September 1979.

Medium Term Projections of Companies' Financial Flows: a Disaggregated Approach

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How much external finance will each of Britain's major companies need in each of the next 10 years? This paper sketches the approach that we are adopting to this and some related questions using the Cambridge Growth Project's (CGP) large scale disaggregated model of the British economy in conjunction with an extensive data bank of companies' financial accounts. It also provides some illustrative answers for three British companies.

The CGP model has been developed over a number of years under the direction of Professor Sir Richard Stone, and Dr. T. S. Barker (an earlier version of the model is described in detail in Barker (1976)). It has a number of special merits, but perhaps chief amongst these for our purpose of projections at the company level is its modelling of the main economic variables (output, investment, stockbuilding, prices, profits, etc.) for each of forty separate industries. Associated with this disaggregated approach is the explicit specification of the inter-relationships between industries—through input-output matrices. As well as going into more industry detail than is common in models of the British economy, the CGP model also focuses on a more distant time horizon than most: the version we use in this paper projects to 1989. And because such long periods are under scrutiny, particular attention is paid by the CGP to longer-term channels of influence, such as that from investment to productivity—relations often disregarded in short-term modelling.

The data bank of company accounts has been developed using the figures prepared by the

Department of Industry from companies' published accounts. For all but the smallest quoted companies engaged primarily in manufacturing and distribution in the United Kingdom, the data bank provides an income appropriation account, a balance sheet and a flow of funds statement. And, so far as is feasible, given legal and institutional changes and the incomplete disclosure of information characteristic of many British companies, these accounts are standardised both over time and across companies.² Moreover, these annual data are now assembled for each year from 1948 until the seventies, so that time series econometric analysis of the relationships between them is possible.

These two sources of information have been combined to produce conditional funds flow projections for individual companies. The projections are conditional on assumptions about 'exogenous' developments (such as the growth of the world economy, the UK Government's tax policies, and demographic factors); about the response of one variable to another (for instance, it is assumed that savings will continue to respond as before to changes in income); and about the strategies of individual companies (whether they maintain their market shares, whether they diversify, etc). Thus one can trace what would happen to a particular company's finances if the world economy grew at a particular rate, the government adopted a defined set of policies, economic agents behaved as they did in the past, and companies maintained stable market shares. Then as a further exercise, it is possible to trace the effects of substituting one or more alternative assumptions, such as more

¹We are very grateful to the Cambridge Growth Project which has allowed us to use results generated by its model; to Ms. M. Clarke and Dr. L. J. Slater for statistical and programming assistance; to the Esmée Fairbairn Charitable Trust for financing the research reported here; and to Professor G. Whittington and an anonymous referee for helpful suggestions.

²This data bank has been built up by Professor G. Whittington and the present authors. We are very grateful to the Department of Industry for providing the basic accounting data and for continued assistance. Further details of the data bank and of its shortcomings are provided in Meeks and Whittington (1976).

favourable developments in world trade, a different exchange rate, or entry by the firm into an industry with outstanding profit prospects.

The results of such exercises are relevant to those in government who are managing macro-economic policy instruments, since projections for the company sector built up from individual company results such as these represent an advance over the aggregate models of the company sector conventionally used in forecasting. This is partly because of well-known aggregation problems which mean that only in the most peculiar circumstances would projections produced at the aggregate level for the company sector equal the summed projections for individual companies. But these disaggregated projections are also potentially useful to those responsible for individual companies' medium-term planning: they provide a guide to the implications of macro-economic developments for the company's finances if policies are unchanged; and they offer a framework for analysing alternative policies such as diversification in response to these developments.

Private sector companies, nationalised industries, government departments, etc. are already using the CGP model to analyse economic developments over a longer time period than most forecasting models consider. The modelling we report here will add individual companies' financial flows to the information available to such users.

The interaction of the CGP model and the financial data for companies

The interaction between these two sources of information can be illustrated with an accounting identity which defines external finance requirements, the focus of this paper:

$$e \equiv g + s + c - (p - t - d - i + r) \quad (i)$$

where:

- e = external finance
- g = gross investment in tangible fixed assets
- s = stockbuilding (including stock appreciation)
- c = accumulation of net current assets (the net increase in credit given plus the increase in net liquid assets)
- p = gross trading profits (including depreciation and stock appreciation; pre-tax; and after charging short-term but not long-term loan interest)

- t = corporation tax payments
- d = dividend payments
- i = payments of long-term interest
- r = non-trading income (post-tax).

This identity gives external finance requirements as spending on fixed and current assets ($g + s + c$) minus retentions (the sum of the income appropriation account represented by the terms in the bracket). In the projections which we present below, gross profits and the terms outside the bracket are derived from information produced by the CGP model, whereas the items in the appropriation account are generated at the company level.

Gross profits and the 'uses' of funds

The CGP model generates projections of profits, investment and stockbuilding for each of forty industries for each year in the next decade given various assumptions about the 'external' influences on the economy mentioned above (the growth of world incomes, for instance).

The projection of an individual company i 's profits in a future year, y , is derived from the CGP's industry projections:

$$p_{iy} = \sum_{j=1}^{41} \left(\frac{p_{ijy^*}}{tp_{jy^*}} \right) tp_{jy} \quad (ii)$$

where:

- p_{iy} = profit earned by company i in year y
- p_{ijy^*} = profit derived by company i from its operations in industry j in the base year, y^*
- tp_{jy^*} = total profit earned by industry j in the base year, y^*
- tp_{jy} = total profit earned by industry j in a year of the projection period, y .

The implicit assumption in this calculation is that a company's subsidiary in a particular industry earns a constant proportion of the industry's total profit; and this proportion is set at the value observed in the base year. But although in this model the company's share of an industry's profits is constant, there is still scope for changes in the proportion of the company's total profit contributed by its subsidiary in a particular industry. This is because the different industries in which the company is represented display diverse rates of growth of profit over the projection period (as Table 2 below shows).

An industry's total profits from UK activities

(*tp*) are earned on sales to domestic buyers and on exports. The proportion of output exported varies by industry and the factors which, in the CGP model, determine profits on home sales differ from those affecting export profits. The former are derived from a percentage markup over labour costs, this markup varying with the business cycle (a trend term is also incorporated in the markup model). But the price of a unit of exported output (and hence the profit on exports) depends in the model not just on the state of the domestic business cycle and on trend movements, but also on foreign prices, the exchange rate and the growth of foreign production.³

Of course, many major British companies do not rely for their profit entirely on UK activities: they often have substantial subsidiaries operating overseas. For this reason we have added to the CGP list of forty industries (which consist exclusively of production within the UK) a forty-first 'industry' representing overseas operations; and we have supplied data on the projected expansion of this sector to complement the CGP projections for home industries.⁴

The projections of company investment and stockbuilding are derived from the CGP's industry figures along similar lines to those for profits:

$$g_{iy} = \sum_{j=1}^{41} \left(\frac{g_{ijy^*}}{tg_{jy^*}} \right) tg_{jy} \quad (\text{iii})$$

$$s_{iy} = \sum_{j=1}^{41} \left(\frac{s_{ijy^*}}{ts_{jy^*}} \right) ts_{jy} \quad (\text{iv})$$

where

- g_{iy} = investment carried out by company i in year y
- g_{ijy^*} = investment carried out by company i in industry j in the base year, y^*
- tg_{jy^*} = total investment carried out in industry j in the base year, y^*
- tg_{jy} = total investment carried out in industry j in a year of the projection period, y

and the stockbuilding variables are defined analogously with those for investment.

For each industry a model of investment is estimated by the CGP separately for each of three categories of investment: buildings, vehicles, and

plant and machinery. Apart from a trend term, the explanatory variables in this model represent expected output and relative prices, these relative prices incorporating the effect of company taxes and investment incentives. The model of stockbuilding is estimated at the industry level for two categories, materials and fuels on the one hand and work in progress together with finished goods on the other: stockbuilding is adjusted in response to output changes.⁵

Since the CGP model does not generate projections of industries' requirements of net current assets, an extra step is needed to derive companies' requirements. Accordingly, in our projections a company is assumed to require net current assets equal to a constant proportion (k) of its sales (x), so that c , the necessary change in net current assets, is $k\Delta x$, where x is obtained from CGP industry figures following the usual procedure:

$$x_{ij} = \sum_{j=1}^{41} \left(\frac{x_{ijy^*}}{tx_{jy^*}} \right) tx_{jy} \quad (\text{v})$$

where:

- x_{ijy^*} = sales of company i from subsidiaries in industry j in the base year, y^*
- tx_{jy^*} = total sales of industry j in the base year, y^*
- tx_{jy} = total sales of industry j in a year of the projection period, y .

The components of demand which determine a CGP industry's output in some cases come directly from projections of final demand generated by the model (this is so with stockbuilding, investment, exports and home consumption), and in other cases are intermediate demands (output from one industry being used as an input for another—this is where the input-output framework of the model is important), whilst the remaining category of demand, government expenditure, is treated as exogenous.⁶

Appropriations of income

Once we have derived projections of a company's gross income and capital spending from the CGP figures we are in a position to estimate its appropriations of income.

The tax accrual in year y is based on several assumptions about the form of the tax system in the projection period. We assume that spending

³See Beath (1976) on the pricing of home sales and Winters (1976) on export prices in (an earlier version of) the model.

⁴Overseas profit, investment, stockbuilding and sales are projected to grow at the same rate as the projected value of world industrial output in the CGP model.

⁵For details of the CGP model of fixed investment, see Peterson (1976) and for that of stockbuilding see Witcomb (1978).

⁶See Barker (1976) on the determinants of demand.

on plant and machinery and on vehicles will qualify throughout for 100% first-year depreciation allowances; and our model makes stock appreciation (calculated on the CSO basis) exempt from tax. It is also assumed that all loan interest will continue to be excluded from taxable income.⁷

Then we can write the tax accrual as:

$$t_y = f_y(p_y - g_{my} - g_{vy} - sa_y - i_y - h_y) \quad (\text{vi})$$

where:

f = rate of corporation tax

g_m = investment in plant and machinery

g_v = investment in vehicles

sa = stock appreciation

h = depreciation allowances (for tax purposes) brought forward from the previous year (i.e. unused tax allowances from previous years).

And the tax payment in any year is the appropriately lagged accrual.⁸

It is in estimating dividends that the importance of the long series of accounts provided by our data bank becomes obvious. For we use the company's data for 1949-75 to estimate a model of the dividend decision:

$$\log d'_y = b_0 + b_1 \log(1 - f_y)p_y + b_2 \log d'_{y-1} + b_3 \log \theta_y + b_4 n_y + a_y \quad (\text{vii})$$

where:

d' = gross dividend

$b_0, b_1 \dots$ = estimated regression coefficients

θ = opportunity cost of retained profits in terms of gross dividends foregone

n = time trend

a = error term.

Further discussion of this form of dividend model can be found in King (1976 and 1977). The theory underlying the model is that dividends will move through a partial adjustment process towards a target payout ratio; and that companies will also adjust their dividends in response to changes in the relative tax rates on dividends and retentions. Accrued net dividends (d_y) are found by assuming that the imputation system is continued with the rate of imputation maintained equal to the basic rate of income tax (ss , assumed to be 0.35). It is this 'net' dividend which

is the cost to the company and therefore the measure relevant to the flow of funds statement here. Thus:

$$d_y = d'_y(1 - ss) \quad (\text{viii})$$

The dividend payment is set equal to the net accrual lagged one year.

In calculating the company's interest payable in the projection period we assume that it redeems none of the long term debt shown in its base year balance sheet; and since this debt will have been issued at fixed rates of interest we can assume that the total interest payable on this opening stock of debt will remain unchanged over the projection period. But the interest bill in future years will be increased if further debt has been taken on; and the amount by which it increases at the start of each year $y + 1$ will depend on the volume of total new external finance that is required (e_y), the proportion of this new finance which takes the form of borrowing, and the rate of interest payable on that borrowing. New external finance (e_y) is of course given by (i) above, and we make two assumptions about the respective contribution of debt and equity to this total. In the short run of the accounting year we assume that it all takes the form of short term borrowing.⁹ Thus interest will be payable on the average value of this borrowing during the year ($\lambda_y \frac{1}{2} e_y$, where λ is the short term rate of interest). At the beginning of the following year we assume that the company issues shares and long term debt to finance the whole of e_y and in proportions which will maintain its base year capital gearing ratio; and that the company pays the going long term rate of interest (δ_{y+1}) on the long term debt issues in $y + 1$ (ΔL_{y+1}). Combining these components of the interest appropriation gives:

$$i_y = i_{y-1} + \lambda_y \frac{1}{2} e_y D_0 + \delta_y \Delta L_y - \lambda_{y-1} \frac{1}{2} e_{y-1} D_1 \quad (\text{ix})$$

where:

D_0 equals zero if $e_y \leq 0$; and one if $e_y > 0$

D_1 equals zero if $e_{y-1} \leq 0$; and one if $e_{y-1} > 0$

The final term in this equation ($\lambda_{y-1} \frac{1}{2} e_{y-1} D_1$) represents the short term interest element contained in i_{y-1} on short term borrowing in $y - 1$ to finance e_{y-1} . This borrowing is replaced at the beginning of y with equity and long term debt (ΔL_y); so this part of i_{y-1} does not recur in subsequent years.

Interest payments are closely tied up in our model with receipts of non-trading income, for if a firm's capital spending together with its appro-

⁷The tax on overseas profits is assumed to be determined in the same way as the tax on profit earned at home.

⁸If the company's accounting date falls between April and December the payment in a year is the accrual of 2 years earlier, whereas if the accounting date falls between January and March, the payment is the previous year's accrual.

⁹This applies to the case where $e_y > 0$.

priations of income sum to less than its total income (i.e. $e < 0$ in (i) above), the surplus ($-e$) goes to augment its income-yielding financial assets, and hence swells non-trading income (r). These financial assets are also increased in the model because of companies' deliberate accumulation of liquid assets to meet trading needs. We have built into the model an assumption that companies expand their stock of net debtors, marketable securities, deposit account balances, etc. in line with sales ($c = k\Delta x$); and in estimating r we hold the proportion of these assets that yield income (l) at the level observed in the base year balance sheet. Combining these two sources of increased non-trading income ($-e$ and $lk\Delta x$), and supplying the simplifying assumptions that the rate of interest received equals that payable (i.e. λ) and that interest is received on the average level for the year gives the following expression for r :

$$r_y = r_{y-1} + \frac{1}{2}\lambda_{y-1}(-e_{y-1})D_3 + \frac{1}{2}\lambda_{y-1}lk\Delta x_{y-1} \\ + \frac{1}{2}\lambda_y(-e_y)D_2 + \frac{1}{2}\lambda_y lk\Delta x_y \quad (x)$$

where:

D_2 equals zero if $e_y \geq 0$; and one if $e_y < 0$

D_3 equals zero if $e_{y-1} \geq 0$; and one if $e_{y-1} < 0$

There is then a clear interdependence within the model between e , i and r even within a single year and this requires a simultaneous solution. But the interdependence of these variables from one year to the next is very significant too. For, on the realistic assumptions that we have supplied, the need to raise external finance in one year not only boosts the short term interest payments in that same year (and hence further raises the need for external finance) but also prompts an issue of long term debt in the succeeding year. The interest payments on those long term loans represent a continuing drain on succeeding years' income and will increase any subsequent requirement of external finance. Conversely, a year of financial surplus creates a stock of financial assets which yield non-trading income in both the present and future years and consequently reduce the firm's reliance on external finance.

The cumulative effect of a rise or fall in profit in relation to the various outflows is reinforced by the dividend model that we have incorporated. This model has the characteristic that dividends do not adjust completely and instantaneously in response to an improvement or decline in a firm's fortunes. Thus, if profit increases sharply, dividends will typically increase by a smaller proportion, with the result that retentions receive a dis-

proportionate fillip; whilst a sudden decline in profit will not be matched in the same year by a corresponding decline in dividends, retentions will suffer disproportionately and external finance will have to increase, bringing higher interest charges in their train.

The practical importance of these cumulative effects is shown by our illustrative projections.

Illustrations for three companies

The three companies for which we have prepared projections were chosen from the subset of companies we are studying whose dividend models did not present unresolved econometric problems; and from among this subset companies have been selected which illustrate the diversity of these projections for different members of the company sector. Whilst all the components of each company's projection are derived from a real company's accounting data coupled with CGP figures for the industries in which it operates, we have hesitated to disclose the identity of the particular companies or industries involved lest we appear to lend a spurious accuracy to what are only first attempts with a new approach. We therefore call the companies α , β and γ , and the industries in which they are represented (including the overseas sector) A, B, ... I.

Table 1 shows the distribution of our three companies' profits and sales among the nine industries in which they are represented. The companies overlap one another's activities to only a limited extent (the prime industry is different in each case). And each of the companies is relatively diversified: an index which expresses the degree of diversification as equivalent to the company operating equally in w industries gives a score of 2.5 industries for β , 2.1 for α and 1.9 for γ .¹⁰

Table 2 reports indices of profits (1977 = 100) for each of the CGP industries in which our three companies operate. These are derived from projections using a recent version of the model and illustrate the input that the main CGP model provides for the companies model. Comparing the last row of the table with the values for 1977 shows the great disparities that develop between the profits growth of different industries: to take the extreme examples, industry F is projected to

¹⁰For the derivation of this index see Utton (1977). It is defined to be ... $W = 2 \sum_{i=1}^n i \cdot P_i - 1$, where P_i is the proportion of the company's sales in the i th industry, i is the ranking of each industry according to P ; and n is the number of industries.

Table 1									
The distribution between CGP industries of the sample companies' profits and sales, 1976									
Profits %									
Company	Industry								
	A	B	C	D	E	F	G	H	I
α					41	1		18	40
β			74	2	3		(2)		23
γ	60	32							7
Sales %									
Company	Industry								
	A	B	C	D	E	F	G	H	I
α					53	6		1	40
β			50	3	3		6		39
γ	61	32							7

Note. The rows do not always sum to 100% because of rounding.
Source: Own calculations using the companies' published accounts.

enjoy a 14-fold increase in profits whereas industry A runs into losses by the end of the period. We can infer from the industry profit figures the projected values for our companies on the assumption that they each maintain their share of their respective industries' profits (see equation ii above); and the resulting company projections show divergent profit trends. These are reported in full in the first column of Table 4, while Table 3 provides a brief summary of the proportionate growth over the whole period of profits and of each other component of the accounting identity (i) above. It emerges that α enjoys profit growth of over 300% during the period; and β 's profit expands significantly to

220% of its initial level, whereas γ 's profits collapse.

Each company's uses of funds on accumulating additional fixed assets, stocks and net current assets can be derived in similar ways from industry values for investment, stockbuilding and sales.¹¹ It turns out that company β enjoys mem-

¹¹An extra source of error is introduced into the investment and stockbuilding projections at this stage since we did not have data for each company's base year allocation of investment and stockbuilding to CGP industries. We therefore assumed that the base year allocation for these variables mirrored that for sales, i.e.:

$$\frac{g_{ijy^*}}{tg_{jy^*}} = \frac{s_{ijy^*}}{ts_{jy^*}} = \frac{x_{ijy^*}}{tx_{jy^*}}$$

Table 2									
Indices of profits for CGP industries in the projection period (1977 = 100), current prices									
YR/IND	A	B	C	D	E	F	G	H	I
1976	101.8	96.2	86.0	121.1	86.7	65.1	101.7	86.8	87.6
1977	100	100	100	100	100	100	100	100	100
1978	98.2	104.0	116.3	82.6	115.3	153.4	98.3	115.2	114.2
1979	95.2	103.1	108.6	121.6	118.3	118.5	158.3	128.4	130.3
1980	90.3	104.6	122.5	117.4	135.6	174.1	173.3	144.0	146.4
1981	83.0	104.0	146.1	90.4	165.8	188.9	181.7	161.3	160.8
1982	72.1	99.8	163.3	85.0	191.3	288.9	205.0	177.2	175.9
1983	60.0	96.0	181.2	84.4	220.1	374.1	225.0	193.4	192.3
1984	46.1	91.2	193.7	80.2	248.5	474.1	248.3	211.0	210.2
1985	30.3	85.4	208.9	79.0	281.5	616.7	276.7	229.4	229.6
1986	11.5	77.4	227.3	76.0	311.7	777.8	305.0	248.9	251.1
1987	-9.7	68.6	242.2	74.3	340.3	942.6	338.3	269.0	274.4
1988	-34.5	57.3	255.3	70.7	373.1	1,142.6	375.0	290.6	300.0
1989	-62.4	43.8	266.2	62.3	398.3	1,409.3	413.3	314.1	327.8

Source: CGP—standard run using MDM3 version of the model.

Table 3
The percentage change in different inflows and outflows, 1976-89

Company	<i>p</i>	<i>g</i>	<i>s</i>	<i>c</i>	<i>t</i>	<i>i</i>	<i>d</i>	<i>r</i>	<i>e</i>
α	321	233	80	0	811	586	276	0	57
β	220	360	163	38	-100	710	322	297	414
λ	-95	255	34	0	-100	1,400	-82	0	1,097

Table 4
Projections of profit (*p*), investment (*g*), stockbuilding (*s*) and the accumulation of net current assets (*c*), 1976-89, £ million, current prices

YR/ Company	<i>p</i>			<i>g</i>			<i>s</i>			<i>c</i>		
	α	β	γ	α	β	γ	α	β	γ	α	β	γ
1976	27	725	22	18	438	17	16	150	7	0	121	0
1977	31	836	22	21	543	19	17	159	7	0	63	0
1978	36	964	23	23	678	23	13	172	4	0	71	0
1979	39	946	23	26	854	26	15	198	6	0	80	0
1980	44	1,065	22	29	833	29	15	151	5	0	89	0
1981	51	1,241	21	32	833	32	14	175	5	0	88	0
1982	57	1,378	20	35	967	36	16	213	5	0	92	0
1983	64	1,524	19	39	1,159	39	17	226	6	0	95	0
1984	71	1,639	17	42	1,275	42	19	237	6	0	100	0
1985	79	1,773	15	46	1,378	46	21	269	7	0	119	0
1986	88	1,931	12	49	1,516	49	23	294	7	0	128	0
1987	96	2,070	9	53	1,686	51	25	332	7	0	137	0
1988	105	2,203	5	58	1,849	55	27	358	8	0	152	0
1989	114	2,323	1	61	2,013	59	28	395	9	0	167	0

Table 5
Projections of tax (*t*), interest (*i*) and dividend (*d*) payments of non-trading income (*r*) and external finance requirements (*e*), 1976-89, £ million, current prices

YR/ Company	<i>t</i>			<i>i</i>			<i>d</i>			<i>r</i>			<i>e</i>		
	α	β	γ	α	β	γ	α	β	γ	α	β	γ	α	β	γ
1976	1	99	1	3	68	2	4	85	5	1	46	1	14	191	7
1977	1	99	1	4	88	2	4	85	5	1	56	1	14	145	11
1978	1	99	0	5	109	3	4	103	5	1	64	1	9	203	11
1979	2	95	0	7	154	4	5	122	5	1	73	1	14	485	17
1980	3	101	0	8	183	5	6	139	5	1	83	1	15	348	21
1981	2	0	0	9	196	6	6	157	5	1	92	1	11	117	26
1982	2	0	0	10	210	7	7	179	5	1	101	1	12	183	32
1983	4	94	0	11	238	9	8	202	4	1	110	1	14	379	38
1984	5	104	0	13	280	10	9	227	4	1	119	1	15	466	45
1985	6	78	0	14	330	12	10	252	3	1	129	1	16	523	53
1986	8	60	0	16	385	15	11	278	3	1	141	1	18	589	60
1987	9	47	0	18	438	17	12	305	2	1	153	1	19	721	68
1988	10	35	0	20	494	20	13	332	2	1	167	1	21	851	78
1989	11	0	0	22	555	23	14	360	1	1	182	1	22	984	89



Table 6**Estimates of the dividend model**

The model for gross accruals is:

$$\log d'_y = b_0 + b_1 \log(1 - f_y)p_y + b_2 \log d'_{y-1} + b_3 \log \theta_y + b_4 n_y + a_y$$

The estimates for each company are:

	b_0	b_1	b_2	b_3	b_4	\bar{R}^2	Durbin h
α	0.359	0.409	0.499	0.192	0.004	0.48	0.17
β	-0.038	0.228	0.759	0.286	-0.000	0.98	-1.00
γ	-3.158	1.186	0.062	0.898	0.004	0.83	-0.41

bership of expanding industries and, as Table 3 shows, experiences growth of its annual investment spending by 360% over the projection period, compared with 230% and 250% for α and γ respectively (the detailed annual figures are given in Table 4). Its 1989 spending on stock-building also represents the biggest increase over 1976 for any of the three companies. Moreover, company β is the only one which, on the basis of our models, has to commit funds to expanding net current assets. In the case of the other two companies net current assets are negative at the beginning of the period, and we assume that this situation persists over the projection period so that no cash has to be devoted to augmenting this component of working capital.

Given profits and investment for each of our companies we are able to compute its tax accrual and payment for each year of the projection period. Table 5 reports the projected tax payments for α , β and γ and again the developments over the whole period are summarised in Table 3. Company γ provides an extreme example of tax exhaustion: although its investment is maintained, its profits are dwindling, with the result that it is unable to take advantage of the relief offered by the tax system. Its tax payments fall to zero after 3 years and the depreciation provisions which the Inland Revenue would allow it to set against profits when computing its tax bill exceed

profits by an ever greater margin. Company α is at the other end of the spectrum: in no year does its level of investment match its total profits, and over the period the growth of profits outpaces the growth of investment, with the consequence that tax payments show a 9-fold increase. Company β falls between these two extremes: it pays tax in all but 3 years of the period, but as investment grows more quickly than profit the share of profit paid in tax declines (t in Table 5 falls as a proportion of p in Table 4 from 0.14 in 1976 to 0.02 in 1988 and 0 in 1989).

The relative growth rates of profits and investment are also important influences on the change in interest payments (summarised in Table 3 and detailed in Table 5). This is because these are the major inflow and outflow of cash and affect very significantly the need to borrow. Thus company γ , whose profits collapse, experiences the most rapid expansion of interest payments, and company α , for which investment lags behind profits, records the slowest.

The estimates for the model yielding the dividend projections shown in Tables 3 and 5 are provided in Table 6. As one would expect from a model of this form dividend payments follow the upward trend traced by profits for α and β , and the ultimate decline suffered by γ .

Finally, companies' funds may be augmented by receipts of non-trading income. But of our

Table 7**The percentage contribution of different inflows and outflows to the increase in e between 1976 and 1989**

Company	Percentage increase in e	Percentage of this increase attributable to:							
		Δp	Δg	Δs	Δc	Δt	Δi	Δd	Δr
α	57	-1,111	549	160	0	130	242	130	0
β	414	-202	199	31	6	-12	61	35	-17
γ	1,097	25	51	3	0	-1	26	-5	0

three illustrative companies only β experiences any growth in this item (see Tables 3 and 5). This arises because none of the three has spare funds to invest in financial assets (i.e. e is negative), and only β has to accumulate liquid assets to meet its trading needs (i.e. c is positive). In fact, this supplement to income is quite significant for β , and is equivalent in 1989 to around a third of its payments of long term interest.

Conclusions

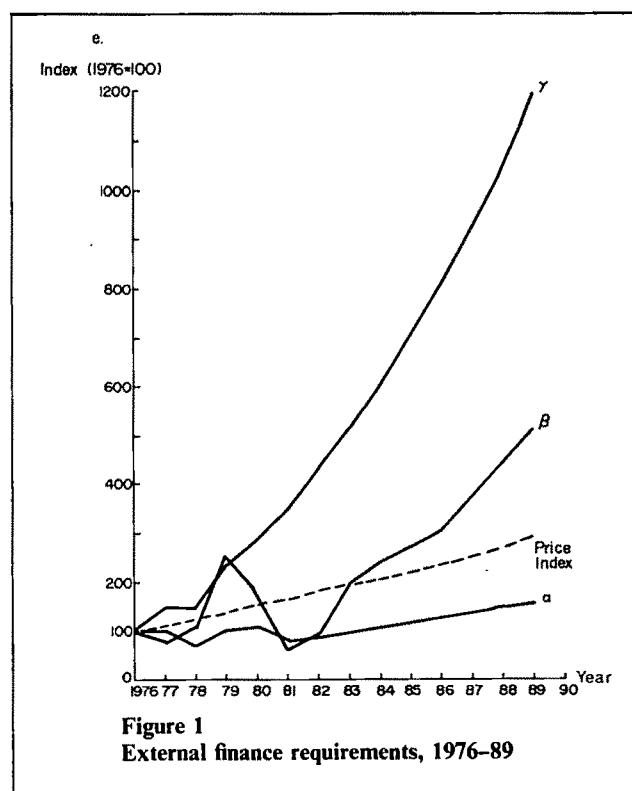
The ultimate effect of these diverse inflows and outflows of funds on our firms' external finance requirements (e) is summarised in a number of ways. First, the proportionate change in e between 1976 and 1989 is given in the summary Table 3. This information along with year to year changes in e is also presented in Figure 1, which, in addition, reports in the dotted line the movement in the price level projected for the period. The volume of external finance required by β and γ rises appreciably over the period. And, as Figure 1 shows, this rise is significant in real terms: whereas the 1989 price index is 2.92 times its 1976 level,¹² e is 5 times the base year value for β and 12 times for γ . For α , however, our projection is

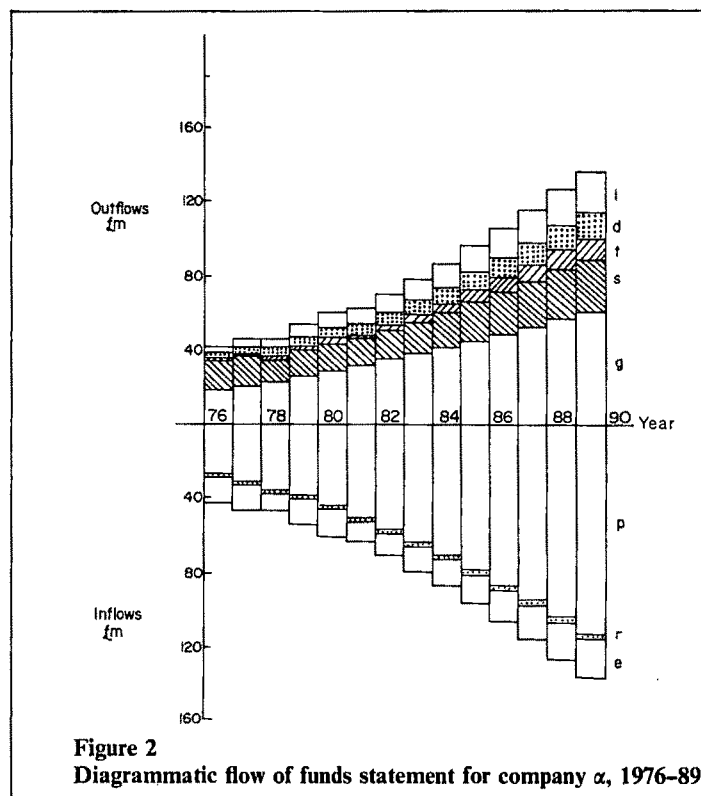
for only a 57% increase in its needs for external finance in money terms—a fall if the flows were expressed in constant prices.

The contribution of different factors to these movements is further explored in Figures 2 to 4 and Table 7. The figures provide a diagrammatic flow of funds statement for the years 1976–1989: the lower half of each diagram records the company's projected inflows, the upper half its outflows (the two always balancing). And Table 7 focusses on the change between the first and last years of the period, attributing the overall change in e for each company to each of the inflows and outflows which enter the accounting identity (i) above. If rounding errors are ignored, the individual contributions in each row of Table 7 sum to 100%.

Summarised in these ways, the diversity of our three companies' experiences becomes very clear. On the one hand, α experiences a considerable growth of profit—enough to cover not only its various appropriations, but also to finance its increased spending on fixed and current assets. On the other hand, β 's growth in trading profits is scarcely sufficient to finance its expansion of fixed investment alone. And, although its trading profits are supplemented by increased non-trading income while tax payments fall, spending on current assets together with growing interest and dividend payments still make necessary the sizeable increase in funds supplied from outside the

¹²This is on an inflation assumption fed into the model and stock appreciation, etc. is computed on the basis of this assumed inflation rate. It is possible to run the model with alternative inflation rates.

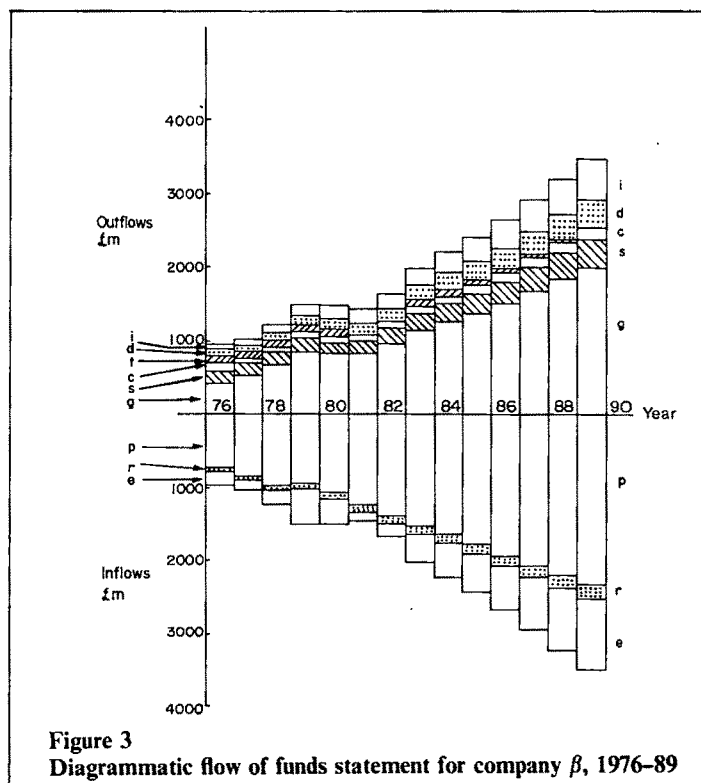




company. It is of course γ which records the most significant percentage increase in e (albeit from a low base year level). This is primarily because its profits collapse while a moderate expansion of investment is maintained; and although dividend

and tax payments fall, rising interest payments interact with rising values of e , in the way described above, to make γ 's predicament more and more desperate.

Of course, these divergent movements only



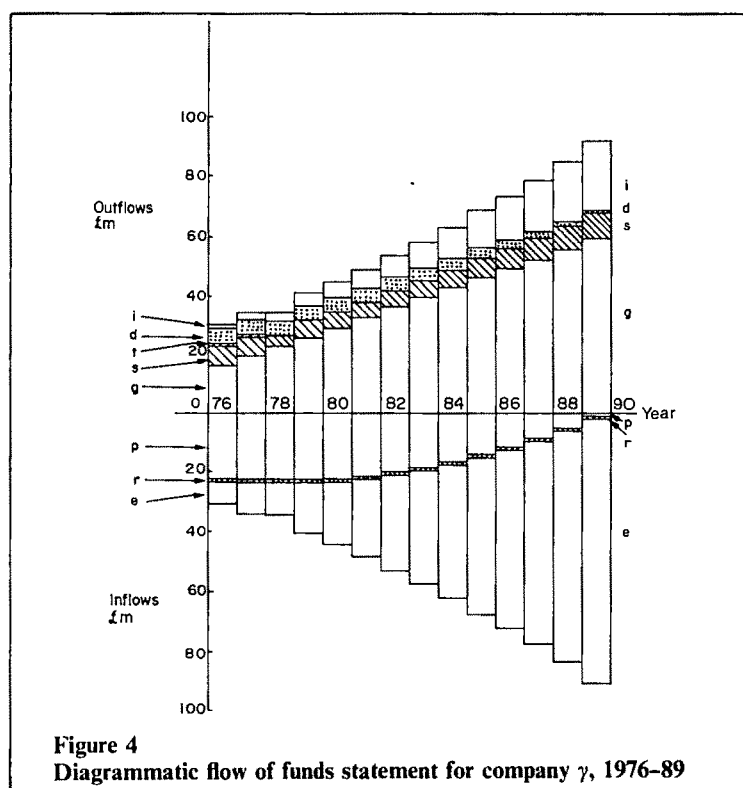


Figure 4
Diagrammatic flow of funds statement for company γ, 1976-89

come out of our models after we have supplied a number of simplifying assumptions, in particular that firms do not diversify further and that they maintain their shares of their respective industries. Nevertheless, these assumptions do not restrict too drastically the usefulness of the results to the companies concerned. Another way of looking at the restrictions is to consider the projections as a guide to what is likely to happen to companies unless they change their industry composition.

And carrying out such conditional forecasts at a disaggregated level may also help to improve the performance of the overall CGP model. This is not just because of the aggregation problems mentioned earlier: it is also the case that aggregate projections may mask significant developments in particular industries and companies; for some companies, such as γ, drastic changes are in store according to our projections. The CGP, in its industry analyses, has drawn attention to the likelihood of widespread company failure in certain sectors¹³ but, in the absence of the detailed financial information that we are now supplying, has so far been unable to forecast the timing and extent of such failures.

We propose therefore to develop this disaggre-

gated approach by modelling all major British companies along the lines sketched here; by improving our modelling of some of the companies' key financial decisions (especially the dividend and gearing decisions); and by incorporating our full set of disaggregated company models in the CGP model so that we can trace the effect on individual companies of alternative macro-economic environments and policies as well as the effect on the national economy of alternative actions by companies.

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¹³See Barker, Peterson and Winters (1978).

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The Investment Performance of Property Unit Trusts Evaluated by Stochastic Dominance

S. L. Lee and C. W. R. Ward

Introduction

There have been a number¹ of studies of unit trusts carried out with the aim of evaluating investment performance, but little attention has been paid in recent years to the rapid growth in the size and numbers of property unit trusts.² This paper discusses the general characteristics of property unit trusts and demonstrates how their investment performances may be analysed. The shortcomings of conventional evaluation techniques are discussed and the concept of 'stochastic dominance' is introduced and applied to the property unit trust data. Founded in rigorous mathematical analysis, stochastic dominance is shown to apply to a wide range of investors whilst the empirical results provide interesting insight into the performance of property unit trusts over the recent past.

Property unit trusts

From the point of view of tax exempt investors or institutions paying preferential tax rates, the changes in taxation contained in the Finance Act 1965 enhanced the value of making direct investment in real property in comparison with holding shares in property companies. However, whilst the largest superannuation funds and insurance

companies were able to own and manage their own property, smaller funds and charities might well have thought that their size and lack of management skills effectively inhibited direct investment in real property. An arrangement was therefore required by which these smaller funds could 'pool' their assets into a larger investment fund in order to acquire direct access to professional management and to obtain the reduction in risk made possible by a large diversified property portfolio.

To meet these requirements, a number of funds were established to invest on behalf of tax-exempt institutions. The funds are termed property unit trusts (PUTs) and, as their name suggests, are organised on similar lines to conventional unit trusts. However, because they invest directly in property they are not authorised unit trusts for purposes of Section 17 of the Prevention of Fraud (Investments) Act 1958, the Trustee Investments Act 1961 or the Income and Corporation Taxes Act 1970. Thus, unlike a conventional unit trust, a PUT is not managed by a separate company and in most cases, the unit holders will expect to participate in the investment and policy decisions. Further, units may only be held by superannuation funds and charities which have sufficiently wide investment powers. In the case of superannuation funds, this includes funds wholly approved by the Inland Revenue (or effectively treated as such for the purposes of Section 208 of the Income and Corporation Taxes Act 1970 or Chapter II of Part II of the Finance Act 1970).³

¹See, for example, P. Moles and S. Taylor, 'Unit Trust Risk-Return Performance 1966-75', *Investment Analyst*, May 1977, pp. 33-42; M. A. Firth, 'The Investment Performance of Unit Trusts in the Period 1965-75', *Journal of Money Credit and Banking*, November 1977, pp. 597-604; C. W. R. Ward and A. Saunders, 'UK Unit Trust Performance, 1964-74', *Journal of Business Finance and Accounting*, Winter 1976, pp. 83-100.

²See, however, P. Olney, 'Some Observations on Pension Fund Property Unit Trusts', *Investment Analyst*, September 1972, pp. 32-42.

³Superannuation funds which are not wholly approved may still hold units under Section 38(1) of the Finance Act 1965, with permission from the Commissioners of the Inland Revenue.

Table 1**Classification of property assets held by sample PUTs as at 1.1.79**

	<i>Offices</i>	<i>Shops</i>	<i>Industrial</i>	<i>Agriculture</i>	<i>Total</i>
Percentage held in property portfolio	41	23	28	8	100

Source: PUTs Annual Report and Accounts, 1979

Table 2**Classification of assets held by sample PUTs as at 1.1.79**

	<i>Freehold property</i>	<i>Leasehold</i>	<i>Cash & short term deposits</i>	<i>Miscellaneous</i>	<i>Total</i>
Percentage holdings	65	20	14	1	100

Source: PUTs Annual Reports and Accounts, 1979

Charities similarly may be exempt under the provisions of Section 360 of the Income and Corporation Taxes Act 1970 and Section 35(1) of the Finance Act 1965.

As its unit holders are exempt from tax, the PUT can claim exemption from capital gains and development gains taxes, and its income and gains are not liable to corporation tax. Although income received by the PUT is assessable for income tax (under Schedule A and Case III of Schedule D), unit holders will normally be able to claim repayment of income tax deducted from distribution.

The first PUT was established in 1966 and, at the beginning of 1979, there were 33 PUTs valued at approximately £1½ billion.⁴ Although the original emphasis was on commercial property investment (offices, shops and industrial premises) both in the UK and overseas, agricultural land has recently become increasingly important. One of the sample funds, for example, held 32% of its portfolio in agricultural property although, in aggregate, agriculture accounted for only 8% of the PUTs' assets (see Table 1). Since 1975, four PUTs have been established specifically to invest in agricultural property.

Originally there was an emphasis on investing in existing developments often by means of 'sale and leaseback', but PUTs have recently been

involved in new development, sometimes in joint partnership with other bodies.

In the nature of property investment, there will often be a considerable delay between the time at which the PUT receives funds from selling units and the time at which these funds are invested in property or development. The results of this delay is that PUTs sometimes have large amounts of liquid assets either in the form of cash on hand or short term deposits (see Table 2). One fund held 23% of its assets in cash and deposits, but even this percentage is not exceptionally high when compared with a number of funds over the past 5 years.

Units are normally issued at monthly or quarterly intervals, although the frequency of issue may be affected by the prevailing market conditions. In particular, the possibility that the PUT may have to re-purchase a significant proportion of units if even one unit holder decides to discontinue its participation poses a problem. Thus, unit holders may be required to give several months notice of withdrawal. This problem may also be reflected in the valuation policy of the PUT since two valuations are sometimes published, the lower of which is applied if unit holders wish the PUT to re-purchase their units at a difficult time. In the event, a large re-purchase may be financed by borrowing on mortgage, by selling property or even by offering units to current or new members.

Although there is usually a recognition that the investment in property has not been associated

⁴Source: Wyatt, Harris Graham Ltd, Survey of Pooled Pension Funds, 1979.

with heavy trading of either the units or the associated property assets, the institutional arrangement does make possible incremental investment in property. This in turn enables the institutional participants to adjust their own exposure to the property market in a relatively sensitive way, which can overcome the illiquidity traditionally attached to property investment.

Investment performance analysis

In the light of the foregoing discussion it follows that institutions will tend to follow the short term changes in their portfolio more actively and will therefore require methods by which the investment valuation and performance of the PUTs may be monitored and evaluated. This active interest in evaluation will be encouraged and accelerated by the recent announcements by two groups of property investment advisers⁵ of the establishment of property investment analysis services.

Initially, a simple approach to monitoring may take the form of reports on the actual investment decisions made, but it might also involve comparisons with other funds of rates of return achieved by the PUT. In this kind of comparison, many analysts consider that the evaluation of investment performance should take into account the level of risk which had to be accepted by the investor in order that the observed rate of return could be achieved.

In equity investment there have been two main methods by which risk has been measured, both of which are associated with the variability of returns. The first has related the risk of the investment with the variability (usually represented by the variance or standard deviation) of returns over the period analysed. The second takes into account only the 'systematic' risk (or that part of the variability that cannot be reduced by diversification), on the grounds that unsystematic risk is of little or no importance within an efficiently-diversified portfolio. The theoretical justification for this latter approach has suffered heavy and effective criticism from Roll⁶ and, despite counter arguments by Mayers and Rice⁷ amongst others,

the results of the approach would appear to be very sensitive to the index which is chosen as a proxy for the market portfolio. In the present application the choice of an appropriate index is particularly difficult as there is a wide range of assets which might justifiably be included in the proxy portfolio. For this reason the consideration of investment performance is restricted to the total risk or variability of returns.

Even this constraint, however, does not provide unambiguous criteria for the evaluation of investment performance. Take for example two funds achieving the following returns over 3 years:

Fund A	10%	16%	34%
Fund B	8%	26%	26%

Each fund has obtained an average return of 20% but the standard deviation of fund A is 10.2, against 8.5 for fund B. On the basis of the mean/standard deviation of returns, fund B would appear to dominate fund A. But some investors might prefer fund A because the worst return achieved by the fund was a gain of 10% whilst the worst return of fund B was only 8%. There is nothing irrational in such a view, but clearly it is not consistent with the belief that the standard deviation is a measure of risk which would be almost universally applicable. This lack of generality also applies to Sharpe's⁸ method of evaluating investment, which takes into account the possibility of borrowing or lending at a 'riskless' rate of interest in order to compare portfolios with unequal standard deviations of returns.

The evaluation of investment performance, as shown above in the simple example, clearly depends on the attitude towards risk of the investor for whom the evaluation is being made. An obvious step therefore in making consistent evaluations is to make explicit assumptions about the type of risk-attitude which might be held by a wide range of investors. It is precisely this problem in which the criteria of stochastic dominance can be used.

Stochastic dominance

Several stochastic dominance criteria have been advocated, each associated with different constraining assumptions. The most general criterion is referred to as the 'first degree of stochastic

⁵Jones Lang Wootton, Richard Ellis/Wood-Mackenzie.

⁶See R. Roll, 'Ambiguity when Performance is Measured by the Securities Market Line', *Journal of Finance*, September 1978, pp. 1051-1069.

⁷See D. Mayers and E. Rice, 'Measuring Portfolio Performance and the Empirical Content of Asset Pricing Models', *Journal of Financial Economics*, 1979, No. 7, pp. 3-28.

⁸W. F. Sharpe, 'Mutual Fund Performance', *Journal of Business*, January 1966, Vol. XXXIX, pp. 119-38.

dominance' (FSD)⁹ and involves only the assumption that investors will prefer higher to lower returns. Consider the following alternative portfolios: A with equi-probable returns of 4% and 9%, and B with returns of 2% and 8%. In comparing these, the simplest question to ask is whether there is any value for which the probability of achieving that percentage return *or less* is greater under A than under B. For example the probability of achieving less than 3% is nil for A, but 0.5 for B. Similarly the probability of achieving less than 8.5% is 0.5 for A, but completely certain for B (since the highest return possible under B is 8%). Thus by comparing the respective observations it can be seen that the probability of achieving less than a given return is always greater for B than A and it can therefore be concluded that all investors who prefer higher returns to lower returns would prefer portfolio A.

Another criterion is the 'second degree of stochastic dominance' (SSD)¹⁰ which can show preferences for all investors who are risk-averse: ('risk-averse' is a term which is used to describe investors who would *always* prefer to accept a cash sum of £X against a gamble in which the equi-probable pay-offs were 0 and £2X). Further, there is a 'third degree of stochastic dominance' (TSD)¹¹ which applies to all investors whose attitude towards risk becomes more tolerant as their wealth increases.

The strength of TSD can be demonstrated by the following example: portfolio A with observed returns of 4%, 8% and 15% may be compared with portfolio B with observed returns of 2%, 11% and 12%. The average return and standard deviation of these portfolios can be seen to be respectively 9.0%, 4.55% for A, and 8.33%, 4.5% for B.

⁹The formal definition of FSD is given in terms of the cumulative probability distributions of the returns from two investment portfolios F and G. That is, when $F(r) \leq G(r)$ for all possible returns r , with a strict inequality holding for at least one value, then F corresponds to a higher level of expected utility than G and is therefore the preferred investment alternative.

¹⁰SSD applies to investors with utility functions for which $dU/dr > 0$, $d^2U/dr^2 < 0$ for all relevant values of returns r . If $F_2(r) \leq G_2(r)$ for all possible returns r , with a strict inequality holding for at least one value of r , then F corresponds to a higher level of expected utility than G and is therefore the preferred alternative. $F_2(r)$, $G_2(r)$ refer to the integral of the cumulative return distributions $F(r)$, $G(r)$.

¹¹TSD applies to investors with utility functions for which $dU/dr > 0$, $d^2U/dr^2 < 0$, $d^3U/dr^3 > 0$ for all relevant values of returns r . If $F_3(r) \leq G_3(r)$ for all possible returns r , with a strict inequality holding for at least one value of r , and if $F_2(r) \leq G_2(r)$ for r max., then F corresponds to a higher level of expected utility than G and is therefore the preferred investment alternative.

Thus A has the higher return but has also a slightly greater standard deviation. When these two portfolios are analysed using the stochastic dominance criteria, it can be shown (see Appendix 1) that neither FSD nor SSD can indicate an unequivocal superiority of A or B, but portfolio A is shown to be superior by TSD. Thus it can be seen that, given a choice of portfolio A or B, most investors would prefer portfolio A.

In terms of published work, stochastic dominance has mainly been used to evaluate performances of open-ended investment funds,¹² but can be applied to a wide range of financial problems and issues.¹³

Empirical method and results

Quarterly returns for twenty PUTs covering the five year period from the first quarter of 1974 were collated and made available by Wyatt Harris Graham Ltd. The constraints on the number of funds in this study were imposed by the time period, since the sample included all the PUTs existing at the start of the period. Had a shorter period been selected more trusts could have been compared, but in that event only a small number of returns would have been available. The present sample of 20 trusts, however, accounts for 91% by value of the funds existing at the beginning of 1979 and, for that reason, may fairly be expected to represent the typical experience of investors in PUTs over the previous five years.

The stochastic dominance comparisons were carried out using a set of BASIC language computer programs based on the Porter, Wart and Ferguson¹⁴ algorithm annotated and corrected by Vickson.¹⁵ The results of the tests are shown in Table 3, ranked in order of achieved average return. As can be seen from Table 3, the operation of FSD provides only a relatively weak criterion

¹²See, for example, O. M. Joy and R. B. Porter, 'Stochastic Dominance and Mutual Fund Performance', *Journal of Financial and Quantitative Analysis*, January 1974, pp. 25-31. R. G. Vickson, 'Stochastic Dominance for Decreasing Absolute Risk Aversion', *Journal of Financial and Quantitative Analysis*, 1975, 10, pp. 799-811. A. Saunders, C. W. R. Ward and R. S. Woodward, 'Stochastic Dominance and the Performance of UK Unit Trusts', *Journal of Financial and Quantitative Analysis*, June 1980.

¹³See G. A. Whitmore and M. C. Findlay, *Stochastic Dominance*, D. C. Heath, 1978.

¹⁴R. B. Porter, J. R. Wart and D. L. Ferguson, 'Efficient Algorithms for Conducting Stochastic Dominance Tests in Large Numbers of Portfolios', *Journal of Financial and Quantitative Analysis*, January 1973, pp. 71-81.

¹⁵R. G. Vickson, University of Waterloo.

Table 3**Results of stochastic dominance tests 1974-1979**

<i>PUT</i>		<i>FSD</i>	<i>SSD</i>	<i>TSD</i>
Provident Mutual Property	(13)	E	E	E
Standard Life Property	(18)	E	E	E
Pennine Property	(10)	E	D	D
Save & Prosper Managed-Property	(16)	E	E	D
Hill Samuel Property	(5)	E	D	D
Charities Property	(1)	E	D	D
Norwich Union Property	(9)	E	D	D
Prudential Property	(14)	E	D	D
Pension Fund (PFPUT)	(11)	E	D	D
Fleming Property	(3)	D	D	D
Public & General (PUTPAGS)	(15)	E	D	D
Pensions & Charities	(12)	D	D	D
L.A.M.I.T. Property	(6)	E	D	D
Lazard Property	(7)	E	D	D
Schroder Property	(17)	D	D	D
Hanover Property	(4)	E	D	D
Legal & General Property	(8)	D	D	D
Confederated Life Property	(2)	E	D	D
Tyndall Managed Property	(19)	D	D	D
Welfare Life Property	(20)	E	D	D
Code numbers shown in parentheses				
E = Efficient				
D = Dominated by at least one Efficient Fund				

for distinguishing investment performance since only five funds are shown to be dominated. Thus FSD ranks three quarters of the sample funds as being efficient. In contrast, SSD provides a very strong criterion since only three funds are classified as efficient; whilst under TSD the efficient set is restricted to two. The implication of these tests is that Provident Mutual and Standard Life performed so well over the period that all likely investors would have chosen to have been holders of one or other of these trusts in preference to any other of the PUTs analysed. In fact by looking at the individual distributions of returns, the strength of the criterion can be revealed: in the case of Provident Mutual, the fund achieved the highest average rate of return (4.1% per quarter) over the period analysed. Thus for investors who were not very risk-averse, the fund provided the best vehicle for achieving high returns. Standard Life, on the other hand, achieved a slightly lower average rate of return but dominated all the other PUTs because it achieved the return at the same time as maintaining a low level of risk. For example, in the worst quarter, Standard Life recorded a profit of 1.8%. In comparison, Pennine recorded at worst -19.5%, Charities recorded -26%, whilst Hanover recorded a large loss of -36%.

Of course it must not be inferred from these results that the investment managers of Provident Mutual and Standard Life are consistently superior to those of the other funds. Nor should it be inferred that the investment managers of Hanover Property Fund are necessarily inefficient in comparison with other fund managements. In common with other methods of investment performance, stochastic dominance criteria are sensitive to the periods chosen as well as to the intervals at which returns are measured. In the present study, an additional complicating factor is the method by which the returns are derived. It would appear that, in some periods, a fund with a large proportion of its assets invested in short term deposits would outperform a fund wholly invested in property, if valuations of property sensitively reflected the illiquid characteristics of the property market. But these qualifications apply equally to other measures and approaches to investment performance. They reflect the general problem of performance evaluation rather than the specific difficulty of applying stochastic dominance.

Comparison with other investments

An interesting insight into the performance of PUTs can be gained from comparing the returns

Table 4

PUTs dominated under SD criteria by FT-Actuaries All Share and the FT-Actuaries Property Group Indices

	PUT Number	
	FTA All Share	FTA Property Group
FSD	None	None
SSD	None	4, 10, 20
TSD	4	1, 4, 6, 10, 11, 15, 20

Note: for name of fund dominated, refer to Table 3.

of PUTs with indices. In this case, it seemed appropriate to use the Financial Times-Actuaries All Share Index and the Financial Times-Actuaries Property Sector Index. Returns were therefore estimated on a quarterly basis by the expression:

$$R_t = (I_t - I_{t-1} + d/4)/I_{t-1},$$

where I_t = index at the beginning of period t ; and d = the dividend yield of the index. The stochastic dominance programs were then rerun to compare the returns derived from each index with every PUT. The results of this test are shown in Table 4.

In examining Table 4, it should be noted that no PUT dominated either of the two indices. This necessarily follows from the association of stochastic dominance criteria with the returns of the

respective distributions: for one distribution to dominate another, the mean returns of the distributions must be similarly ordered. Since the mean returns of the PUTs were all below the mean returns derived from both indices, no PUT could dominate either index. However the strength of investment in PUTs can be seen to lie in their low risk, since only under TSD were a substantial number of PUTs dominated by the FTA Property Index. Thus in comparison with the FTA All Share Index, the PUTs are shown to have provided an efficient method of investment.

Conclusion

The claim has often been made that direct property investment provides a relatively secure return during unsettled economic conditions. PUTs provide an opportunity for pension funds and charities, who do not wish to become involved in property management, to hold a commercial or agricultural property portfolio.

This study has demonstrated the usefulness of stochastic dominance in evaluating the investment performance both between the PUTs and against appropriate indices. Despite the qualification that the results of the analysis are influenced by the proportion of cash held by the PUTs over the period analysed, the traditional association of security and property investment is upheld.

Appendix 1

Work-Sheet for FSD, SSD

i	r_i return (i)	$f(A)$ (Prob) (ii)	$f(B)$ (Prob) (iii)	$F(A)$ Cum(ii) (iv)	$F(B)$ Cum(iii) (v)	FSD_i (iv)-(v) (vi)	$r_i - r_{i-1}$ (vii)	FSD_{i-1} (viii)	$(vii) \times (viii)$ (ix)	SSD_i Cum (ix) (x)
1	2	0	1/3	0	1/3	-1/3	—	—	—	—
2	4	1/3	0	1/3	1/3	0	2	-1/3	-2/3	-2/3
3	8	1/3	0	2/3	1/3	4	0	0	-2/3	
4	11	0	1/3	2/3	2/3	0	3	1/3	1	1/3
5	12	0	1/3	1/3	1	-1/3	1	0	0	1/3
6	15	1/3	0	1	1	0	3	-1/3	-1	-2/3

Under FSD, for A to be preferred to B all entries in column (vi) should be negative or zero.

Under FSD, for A to be preferred to B, all entries in column (x) should be negative or zero.

Work-Sheet for TSD

i	r_i	$r_i - r_{i-1}$ Col (vii) above (iii)	SSD_i Col (x) above (iv)	SSD_{i-1} (v)	Average of (iv) and (v) (vi)	$(iii) \times (vi)$ (vii)	TSO_i Cum(vii) (viii)
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
1	2	—	—	—	—	—	—
2	4	2	-2/3	—	-1/3	-2/3	-2/3
3	8	4	-2/3	-2/3	-2/3	-8/3	-10/3
4	11	3	1/3	-2/3	-1/6	-3/6	-23/6
5	12	1	1/3	1/3	1/3	1/3	-21/6
6	15	3	-2/3	1/3	-1/6	-3/6	-24/6

Under TSD, for A to be preferred to B, all entries in column (viii) should be negative or zero and the last entry in column (iv) should be negative or zero.

Source: E. E. Williams and M. Chapman Findlay III, *Investment Analysis*, Prentice-Hall, 1974.

Deferred Taxes—an 'Explicit Cost' Solution to the Discounting Problem

Kenneth W. Lemke and Paul R. Graul

Judging by some reactions to SSAP 15 (ICAEW, 1978), reconsideration of a present value basis of reporting deferred taxes in the balance sheet would appear to be timely. One critic of SSAP 15 purports to show that a 'correct' valuation of the liability for deferred taxes is the present value of all future tax payments, regardless of the length of time during which timing differences are expected to recur (Watson, 1979, pp. 338, 346). The supporting computations take for granted that a company's cost of equity capital is the appropriate discount rate, without offering any critique of alternative discount-rate proposals. A North American writer points out that: 'SSAP 15... permits a somewhat arbitrary application of discounting by allowing amounts not reversible in the succeeding 3 years to be excluded from the deferred tax provision in many cases' (Lay, 1980, p. 47). He calls upon the accounting profession to 'give priority to the complex issue of discounting deferred taxes' (p. 46).

This paper proposes what we believe to be a definitive solution to the problem of whether and how to measure deferred tax 'liabilities' on a discounted present value basis. We begin with a brief survey of discount rate proposals published to date. A fact overlooked in these proposals suggests our solution to the problem. A numerical example then illustrates the principal weaknesses of alternative discount rate proposals in comparison with our proposal. A general rationale for our solution follows, and we conclude with some further critique of the alternatives.

Which discount rate?

SSAP 15 is silent about the possibility of using a discounted basis of measuring those deferred taxes which it requires to be reported. By implication, discounting of reported tax deferrals presumably is not permitted; and non-reported deferrals are, in effect, discounted at a 100% rate.

Discounting of deferred taxes is expressly forbidden by *APB Opinion 10* (AICPA, 1966, para. 6)

and *APB Opinion 11* (AICPA, 1967, para. 3), pending further study of the discounting question in relation to financial accounting in general. In the meantime, several approaches to the problem of selecting a discount rate for deferred taxes have been suggested. Following the widely-held view that deferred taxes comprise an 'interest-free loan' from the government, Keller (1961, pp. 81 and 118) has suggested a zero discount rate. Wheeler and Gallart (1974, p. 90) also opt for a zero rate, but for a different reason. They argue that a cash equivalent price for the government services notionally obtained in exchange for an income tax 'liability' does not exist, and that (ignoring changes in tax rates) the dollar cost of those services is the same regardless of whether payment is made now or later. Black (1966, pp. 84 and 115) holds that the discount rate should be the 'internal earning rate of the company'. Nurnberg (1971, p. 119; and 1972, p. 661) argues that the rate of discount should be the after-tax cost of debt, the estimated cost of equity, or a weighted average of both, depending on 'the prior disposition of funds retained by deferring taxes'. In a review of Nurnberg's arguments, Williams and Findlay (1975, p. 127) conclude that the appropriate discount rate is the 'tax adjusted cost of equity capital' [defined as the cost of equity multiplied by $(1 - r)$, where r is the tax rate].

We suggest that a simple but essential fact has been overlooked thus far in the search for a discount rate. All of the solutions noted above assume that an *explicit* cost of deferred tax funds does not exist. However, there is an explicit future return to the government on deferred taxes, and, obversely, an explicit future cost of deferred taxes to the firm. That return/cost consists of the future tax payments on any incremental taxable income that the firm may derive from investment of the funds made available to it by way of tax deferrals. Using the 'explicit cost' as the discount rate, we will show that *the discounted present value of deferred taxes is equal to their absolute amount no matter what amount or pattern of contribution to*

future taxable income is derived from investment of the funds made available by tax deferrals.

The use of an identifiable (explicit) cost of funds to discount the future cash flows associated with those funds is, of course, consistent with generally accepted accounting principles (GAAP) for the valuation of long-term payables and receivables (APB Opinion No. 21, AICPA, 1971). A non-zero cost of funds reflects that the associated cash flows (e.g. principal and interest payments) have a non-zero time value, and discounting is necessary to recognise this time value. In specifying the cash flows to be discounted, inclusion of the explicit return to the government on deferred taxes is analogous to the inclusion of interest payments in the cash flows discounted when valuing other long-term debt.

Illustration

We illustrate some key features of our own and alternative discount rate proposals by an example in which deferred taxes result from a depreciation timing difference.

Assumptions:

1. A company is formed at the beginning of year 1 with capital of \$900.
2. This \$900 is expended immediately to acquire a machine with a 3 year economic life and zero expected salvage value.
3. Expected net cash inflows from operations (sales, less cash operating expenses) are \$930,

\$720 and \$510 for years 1, 2 and 3 respectively. For convenience, cash flows are assumed to occur at the end of the year.

4. The company uses the straight-line method of depreciation for financial reporting purposes.

5. A 'First-Year Allowance' of 100% is available for tax purposes and is claimed in year 1.

6. The company income tax rate is 40%.

7. Tax payments occur at the end of the year in which the related taxable income occurs.

8. To avoid the unnecessary complications of recurring machinery acquisitions and reinvestment of net cash inflows, we assume that the company will liquidate. Hence, the company's net cash inflows (including cash recoveries of owners' equity) are disbursed to stockholders annually.

Exhibit 1 shows the anticipated cash flows relating to the 3 year life of the machine, and the disposition of the cash.

Note that if it were not for the 100% 'First-Year Allowance' claimed for tax purposes, the company would have to obtain \$240 of funds or reduce the dividend to owners by \$240, in order to pay additional taxes in year 1. Continuing investment in the machine has thus been financed in part by deferred taxes. If this were not so, cash flows to the government and to owners would be different than in Exhibit 1. This point has been overlooked or incorrectly stated in other studies. For example, Nurnberg says (1972, p. 657): 'A

Exhibit 1				
Anticipated Cash Flows				
	End of Year, \$			
	1	2	3	Total
Cash Inflows:				
Sales, less Cash Operating Expenses	930	720	510	2,160
Cash Outflows:				
For Income Taxes:				
Reversal of Deferred Taxes	—	120	120	240
Other	*12	168	84	264
	12	288	204	504
To Owners—				
Recovery of Original Investment	300	300	300	900
**Dividend (= Net Income less				
Tax Payments)	618	132	6	756
Total Outflows	930	720	510	2,160
*\$930 - \$900 = \$30				
\$30 × 40% = \$12				
**\$930 - \$300 - \$12 = \$618				
\$720 - \$300 - \$288 = \$132				
\$510 - \$300 - \$204 = \$6				

Exhibit 2 Present Value of Deferred Taxes at End of Year 1					
TAX PAYMENTS, \$					
Year	*Reversal of deferred taxes	On incremental income from investment of deferred taxes	Total	42% discount factor	Present value at end of year 1, \$
2	120	$240 \times 0.7 \times 0.4 = 67.20$	187.20	0.78125	146.25
3	120	$120 \times 0.7 \times 0.4 = 33.60$	153.60	0.61035	93.75
					<u>240.00</u>
*This represents a return of principal to the government.					

corporation pays the same total amount of taxes over its entire life, other things being equal, whether or not it defers taxes...'. We would point out that, if taxes are not deferred, 'other things' cannot be held 'equal' to a deferral situation. In the non-deferral case, an alternative source of finance must be substituted for deferred taxes (or the scale of business operations must be reduced). If debt is the substitute, taxable income is reduced by interest payments, taxes are correspondingly reduced, and the distribution to owners is decreased by after-tax interest payments on debt. If equity is the substitute, funds will be drawn away from other owner investments. Thus, cash flows to the government and to owners will vary with the method of financing investment in depreciable assets.

Proponents of discounting (including zero-rate proponents) would generally consider the tax payments of \$120 per annum in years 2 and 3 (arising from reversal of deferred taxes) to be the only cash flows in Exhibit 1 relevant to the valuation of deferred taxes. Future tax payments on the incremental income resulting from investment of deferred taxes would be ignored. However, these latter tax payments constitute an explicit return to the government on deferred taxes. The rate of return to the government in the present instance is 28% (i.e. 40% of the 70% before tax rate of return on investment computed in Exhibit 3). Discounting the entire payments stream relating to deferred taxes at this rate, we have the result shown in Exhibit 2—the present value of deferred taxes is equal to their absolute amount.

It is evident from Exhibit 2 that our 'explicit cost' solution is conceptually and computationally different from a zero rate solution, but the result is the same. In fact, our solution, a zero rate, and GAAP all produce financial statements identical with those shown in Exhibit 3.

The accounting rates of return in Exhibit 3 agree with the economics of the investment in the machine. The rate of return on investment is 70% before tax and 42% after tax.

Exhibit 4 exemplifies the financial statements that would result if the deferred tax liability were measured as proposed in alternative positive rate solutions to the discounting problem. The rate used for purposes of illustration in Exhibit 4 is 42%—the rate of return on total investment as derived in Exhibit 3.

The accounting rates of return on total investment in Exhibit 4 are all significantly different from the 'true' economic rates derived in Exhibit 3. In addition, the accounting rate of return on total investment shows a declining trend in Exhibit 4, whereas the 'true' economic rate in Exhibit 3 is constant. Disagreement between economic and accounting rates of return would occur in Exhibit 4 whether the positive constant discount rate used was the after-tax cost of an alternative debt source, the cost of equity, a weighted average of both, or any other positive constant rate. It is true that accrual accounting models do not necessarily show constant rates of return on investment in agreement with the internal rate of return (IRR) computed by means of a discounted cash flow investment-decision model. In fact, discrepancies between the two models constitute a recognised problem in performance evaluation, and formal attempts at reconciliation have been made (e.g. Bierman & Dyckman, 1971, Chapter 17). Disparity arises because of differences between the two models in the allocation of cash flows between capital recovery and income, and because the timing of accounting recognition of some items does not always coincide with the timing of cash flows. However, neither of these reasons explains any part of the rate of return disparity between Exhibits 3 and 4 in our example. The disparity is due

Exhibit 3				
Financial Statements—'Explicit Cost' Solution				
<i>Balance Sheets \$</i>				
	<i>Beginning of Year 1</i>	<i>End of Year</i>		
		<i>1</i>	<i>2</i>	<i>3</i>
Asset: Machine (at Cost, less Depreciation)	900	600	300	—
Owners Equity:				
Capital	900	600	300	—
Retained Earnings:				
Opening Balance		—	(240)	(120)
Net Income		378	252	126
Cash Dividend		(618)	(132)	(6)
	900	360	180	—
Deferred Tax Liability		240	120	—
	900	600	300	—
<i>Income Statements</i>				
		<i>Year, \$</i>		
		<i>1</i>	<i>2</i>	<i>3</i>
Sales, less Cash Operating Expenses		930	720	510
Straight-line Depreciation		(300)	(300)	(300)
Net Income before Taxes		630	420	210
Income Tax Expense		252	168	84
Net Income after Taxes		378	252	126
<i>Accounting Rates of Return</i>				
		<i>Year, %</i>		
		<i>1</i>	<i>2</i>	<i>3</i>
On beginning-of-year Total Investment (Assets):				
Before Tax		70	70	70
After Tax		42	42	42

in its entirety to an arbitrary shifting forward of income (in Exhibit 4) by imputing imaginary interest costs to periods 2 and 3, and imputing a compensating imaginary gain to period 1.¹

¹Discounting in the manner illustrated in Exhibit 4 has the unfortunate (and probably unintentional) effect of pretending that most of the firm's after-tax share of income derived from the investment of deferred taxes was earned at the time the deferred tax liability was established. This pretence, which is patently at variance with the truth, can be seen from the following:

Year	After-tax return to the firm	42% discount factor	Present value at end of year 1
2	\$240 × 42% = \$100.80	0.70423	\$70.99
3	\$120 × 42% = \$50.40	0.49593	\$24.99
			<u>\$95.98</u>

\$95.98 is also the amount recorded in Exhibit 4 as imputed interest income in year 1. Consider the following equality which is true by simple algebra:

$$\frac{i(2x)}{1+i} + \frac{ix}{(1+i)^2} = i \left[\frac{x}{1+i} + \frac{x}{(1+i)^2} \right] + i \left(\frac{x}{1+i} \right)$$

When $i = 42\%$ and $x = \$120$, the left hand side of the above equality represents the computations in this footnote, and the right hand side represents the computations of implicit interest for years 2 and 3 in Exhibit 4. i is the after-tax rate of return to the firm on the investment of deferred taxes and on total assets. i will vary with the tax rate, but the equality is independent of the tax rate.

Taxes on the incremental income earned from investment of deferred taxes may be viewed as the explicit cost of deferred tax finance. As these taxes are included in income tax expense in Exhibit 4, the additional imputation of interest expense in years 2 and 3 is a form of double counting.

General rationale

In the illustration considered above, we assumed that income attributable to the investment of deferred taxes can be identified, and that the rates of return on the investment of deferred taxes and on total investment are constant and equal. However, these assumptions do not restrict the generality of our solution. Vatter (1966) has shown that the present value of a given stream of cash flows is the same whether discounted by a constant average IRR or by a set of unequal periodic IRRs, where the latter depend on the residual net cash inflows remaining after some assumed pattern of capital recovery has been satisfied. Vatter points out that, by convention, an IRR for an investment project is computed as an *average* rate of return over the life of the project.

Exhibit 4				
Financial Statements—an 'Imputed Cost' Solution				
<i>Balance Sheets \$</i>				
	<i>Beginning of Year 1</i>	<i>End of Year</i>		
		<i>1</i>	<i>2</i>	<i>3</i>
Asset: Machine (at Cost, less Depreciation)	<u>900-00</u>	<u>600-00</u>	<u>300-00</u>	<u>—</u>
Owners' Equity:				
Capital	900-00	600-00	300-00	—
Retained Earnings:				
Opening Balance		—	(144-02)	(84-51)
Net Income		473-98	191-51	90-51
Cash Dividend		(618-00)	(132-00)	(6-00)
	<u>900-00</u>	<u>455-98</u>	<u>215-49</u>	<u>—</u>
*Deferred Tax Liability		144-02	84-51	—
	<u>\$900-00</u>	<u>\$600-00</u>	<u>\$300-00</u>	<u>—</u>
<i>Income Statements</i>				
		<i>Year, \$</i>		
		<i>1</i>	<i>2</i>	<i>3</i>
Sales, less Cash Operating Expenses		930-00	720-00	510-00
**Imputed Interest		95-98	(60-49)	(35-49)
Straight-line Depreciation		(300-00)	(300-00)	(300-00)
Net Income before Taxes		<u>725-98</u>	<u>359-51</u>	<u>174-51</u>
Income Tax Expense		252-00	168-00	84-00
Net Income after Taxes		<u>473-98</u>	<u>191-51</u>	<u>90-51</u>
<i>After-Tax Accounting Rates of Return</i>				
		<i>Year, %</i>		
		<i>1</i>	<i>2</i>	<i>3</i>
On beginning-of-period Total Investment (Assets)		52-66	31-92	30-17
*Annuity of \$120 for 2 years, discounted at 42% = $\$120 \times 1.20016 = \$144-02$				
Amount of \$120 for 1 year, discounted at 42% = $\$120 \times 0.70423 = \$84-51$				
** $\$144-02 \times 42\% = \$60-49$				
$\$84-51 \times 42\% = \$35-49$				
<u>\$95-98</u>				

It is constant per period only because the method of computation forces it to be so—i.e. because the method of dividing net cash inflows between income and capital recovery in each period is to take a constant rate of return on investment as a first claim on net cash inflows. The *residual* is then taken as capital recovery. If a predetermined pattern of capital recovery (e.g. constant, decreasing or increasing amounts, corresponding respectively to constant, decreasing or increasing expirations of service potential) was taken as a first claim on net cash inflows, the periodic rate of return would depend on the residual, and would not necessarily be constant from period to period. There is no *a priori* logic which requires that capital recovery rather than income should be the residual. Capital recovery is the residual only if we assume that the rate of return *must* be constant throughout the life of the project. Hence, there are as many sets of periodic rates of return as there are possible variations in the assumed pattern of

capital recovery. Each set will give the same discounted present value (namely, the cost of the project) as obtained by using the (constant average) IRR.

Reversals of deferred taxes give the time pattern of capital recovery by the government. Taxes on income from investment of deferred taxes then comprise 'residual' cash flows (to the government) which may represent a variable periodic percentage return and discount rate. Adapting Vatter's conclusions, this variability does not affect the present value of deferred taxes, which will in fact be equal to the absolute amount of deferred taxes no matter what the amount or pattern of related returns. The specific figures used in our 'illustration' above are therefore unexceptional.

Critique

Our solution to the discounting problem is not constrained by any time horizon for the reversal of deferred taxes. We therefore agree with Watson

(1979, p. 338) that 'assessment of the future liability for taxation in the balance sheet of a company necessitates full accounting for deferred taxation, even where timing differences are expected to recur indefinitely'. However, we come to this conclusion by a different route. With respect to deferred taxes arising from depreciation timing differences, we would also support Watson's conclusion that deferred taxes should be reported in the balance sheet (at present value) as 'government or tax equity' (p. 340). However, we have argued this matter at length elsewhere (Graul and Lemke, 1976); therefore we will not pursue it here.

Recognition that taxes on profits from use of deferred tax funds constitute an explicit return to the government avoids some serious difficulties encountered in previous efforts to solve the discount rate problem. For example, Nurnberg (1972, p. 657) states that 'it may be argued that a deferred tax liability should be measured by the present value of a theoretical fund which would accumulate to its [i.e. the deferred tax liability's] maturity value'. However, he runs into the problem that this solution (like Black's in *ARS No. 9*, 1966) utilises an opportunity cost rather than an incurred cost as the discount rate, and therefore represents a radical departure from GAAP. Defence of the discounted basis of accounting for deferred tax liabilities therefore rests on the argument that it is 'more informative than the accounting presently accorded to them, provided that the interest expense recognized thereon is disclosed separately' (Nurnberg, 1972, p. 658). The search for an appropriate discount rate leads Nurnberg to opt for an assumption that the funds provided by deferred taxes are used to retire debt or equity or some combination of both. However, 'the determination of the relevant alternative is not obvious' (p. 661). The choice of a discount rate is therefore subjective and inconclusive. Moreover, as Williams and Findlay (1975, pp. 123-4) point out, one can almost guess what the managerial election will be. Why designate the deferred tax liability as a debt substitute when it can be discounted at a higher rate by viewing it as an equity substitute? Our discount rate solution avoids such problems.

And what if deferred tax funds are not used as a substitute for debt or equity? It is possible that these funds may not be invested at all by the firm, but paid instead to stockholders by way of increased dividends, or to employees by way of increased salaries, or passed on to customers by way of lower sales prices (Nurnberg, 1972, p. 662;

Williams & Findlay, 1975, pp. 132-3). These possibilities are limitations of Nurnberg's and other solutions to the discounting problem. In the context of our solution, such possibilities simply mean that the return to the government on the relevant deferred taxes is zero. The discount rate is therefore zero, but the present value of these funds is the same as if they had been invested by the firm. Deferred taxes have their own explicit cost, albeit a 'contingent' one—i.e. contingent on the funds being invested and yielding taxable profits. However, the contingent nature of this return does not affect the present value of the deferred tax liability. Hence, our solution to the discounting problem is independent of the specific disposition of the funds provided by deferred taxes.

Two potential criticisms of our proposal should be anticipated. First, in taking a return on *investment* of funds into account in computing the present value of the funds *source*, we are not violating the 'separation rule' which, in cost of capital theory, forbids the matching of specific sources of funds to specific uses. The return to the government *depends upon* (but *does not consist of*) the return to the firm on any assets in which deferred taxes are invested. We do not use a return on assets as the discount rate. We simply acknowledge the unusual circumstance (for debt) that the return to the lender is tied to and varies with project profitability to the firm. Secondly, a firm may, of course, derive taxable income from the investment of funds made available by liabilities other than deferred taxes, but we do not advocate that taxes be included in the discount rate applicable to such liabilities. There is no inconsistency here. In the case of deferred taxes, our proposed discount rate comprises the explicit return to the lender. The explicit return to the government comprises taxes payable on the incremental taxable income (if any) that a firm derives from investment of the funds made available to it by way of tax deferrals. In the case of other liabilities, the return to the lender is exclusive of and independent of taxes paid by the borrower.

Conclusion

Our solution to the discounting problem, as it relates to the valuation of deferred tax liabilities, has significant advantages. It is simple and definitive; it uses explicit rather than opportunity cost rates of return; and it is impervious to uncertainty with respect to the specific utilisation of and return to the firm on deferred tax funds.

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A Further Guide to Research on the Economic Consequences of Accounting Information*

Frank H. Selto and Bruce R. Neumann

Introduction

The recently increased interest in the economic consequences of accounting information which has been expressed both by accounting researchers (May and Sundem, 1976; Zeff, 1978) and by accounting policy makers (FASB, 1978) has opened a wide area of potentially interesting and valuable contributions from accounting researchers of every persuasion. As one contemplates applied research on the economic consequences of accounting information, one must, as counselled by May and Sundem (1976, p. 744), specify the level of analysis. The chosen level of analysis must identify: (1) the level of societal aggregation to be considered, or categories of 'similarly affected individuals' (May and Sundem, 1976, p. 755), and (2) the type of economic effects to be considered. The purpose of this paper is to outline a cross-classification scheme of affected individuals and types of economic effects. This scheme is influenced by cost/benefit analysis literature which, in total, offers a well-discussed, though still controversial, guide to applied, piecemeal policy evaluation (see, for example, Eckstein; Haveman and Margolis, 1973; Davis and Whinston, 1965). It would appear that most of the applied 'economic consequences' literature to date has focused on the effects on stock market prices (for example, FASB, 1978). These effects, though important, are arguably only a small portion of what constitutes economic consequences.

What is accounting information?

One may correctly include under the heading 'accounting information' any economic informa-

tion—that is, any data which might cause a decision maker to reallocate resources or redistribute wealth among individuals. However, this very broad definition of accounting information is not likely to be very directive for accounting research. We have chosen to restrict the definition of accounting information to include:

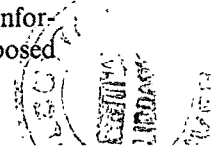
- (1) Financial statements and/or financial information for economic entities for use by investors, creditors, government regulators and other interested external parties.
- (2) Financial statements, budgets and special planning, evaluation and control reports for internal, private use by economic entities.

This narrower definition is still sufficiently rich to permit a wide range of inquiry into the economic consequences of accounting information. For example, within this definition are contained disclosed earnings per share numbers of private firms, cost compliance reports from hospitals, alternative managerial performance measures, and cost information required by US Cost Accounting Standards.

Who is affected by accounting information?

Broad categories of those affected by accounting information are: (1) suppliers of information, (2) users, and (3) potential suppliers, users and other parties. These categories are far too broad to enable a feasible assessment of economic effects but a broad definition of each category may be subsequently narrowed. A 'supplier' of accounting information is any economic entity which commits real resources to produce and provide such information. A supplier may volunteer such information or may comply with externally imposed

*The authors would like to thank Larry Friedman and Barry Spicer for helpful comments.



requirements to do so. The key is that accounting information is costly to produce and requires consumption of resources which the supplier could otherwise use. Suppliers of accounting information include private firms, not-for-profit organisations, auditors, governmental entities and agencies (e.g., the US General Accounting Office, GAO), and, indirectly, accounting policy makers. This last group is categorised as a supplier since this group makes the rules whereby other direct suppliers produce accounting information.

A 'user' of accounting information is any economic decision maker (individual or group) who directly utilises or may utilise accounting information as an input to the decision making process. Therefore, differences in accounting information across time or across suppliers of accounting information may alter a decision maker's choices.

Other parties, who are neither suppliers nor users of accounting information as defined here, may also experience economic consequences of accounting information. For example, a community may be affected (adversely or beneficially) by accounting information, supplied by a major regional employer and used by investors, creditors or regulators, which leads to contraction or expansion of the employer's regional activities. Other examples include such effects as utility rate increases approved by regulatory bodies on the basis of accounting information, and the effects of relaxing air pollution standards for manufacturers because accounting information indicates declining industry profits. Categories of users and suppliers may be usefully, but not exhaustively, delineated as follows:

Suppliers

1. Firms
2. Auditors
3. Government agencies
4. Accounting policy makers

Users

5. Firms
6. Auditors
7. Government agencies
8. Policy makers
9. Investors
10. Creditors
11. Unions
12. Public interest groups
13. Politicians
14. Citizens
15. Unorganised workers and consumers

What are the economic effects of accounting information?

One may describe again very broad categories of effects: (1) resource allocation effects, and (2) income distribution effects. Broadly speaking, resource allocation effects are those which affect the aggregate wealth of the economy (e.g., GNP), and income distribution effects are those which transfer or redistribute that wealth among individuals.¹ Of course, as both a theoretical and a practical matter many resource allocation decisions have coincident income distribution effects and vice versa, but concentration on one or the other effect may be desirable in a specific research effort. As before, further definition of these effects is necessary to focus applied research. These two types of effects contain, for example:

1. Resource Allocation

- A. Among firms and industries
 - i. by investors
 - ii. by creditors
 - iii. by government agencies
- B. Within firms and industries
 - i. by managers
 - ii. by external parties
- C. Between public and private sectors
 - i. by taxation
 - ii. by legislation

2. Income Distribution Among Individuals

- A. Economic classes
 - i. by possession of information
 - ii. by possession of monetary wealth ('economic advantage')
 - iii. by ownership (employee) status
- B. Geographical locations
- C. Both of the above *via*:
 - i. taxation
 - ii. government subsidies
 - iii. government sanctions
 - iv. actions of private individuals

An economic consequences cross-classification

Within each of the above listed categories, further focus is possible and perhaps desirable. For purposes of this paper, further partitioning would prove cumbersome. The classifications are combined in a matrix format to identify specific researchable economic effects of accounting information.

¹Note that one may also speak of primary and secondary effects, but this partially overlapping distinction is not considered here. See Haveman and Krutilla (1967).

Table 1 displays both the categories of those affected and the categories of economic effects of accounting information. The possible foci for research topics are described within each cell, where the cell is marked by the intersection of a group of individuals and the associated economic effects. As shown in Table 1, there are many possible areas for research encompassed by the term 'economic consequences'. To date, only a small number of the cells have been intensively investigated. One has to question whether broader accounting policy and political issues are properly served by our relative ignorance of the many economic consequences of accounting information which are not exhibited in the major stock exchanges. It would appear that there is a broad spectrum of other economic consequences to explore.

It may be useful at this point (1) to list those cells which seem to be logically empty or redundant from an accounting researcher's point of view, (2) to identify examples of extant empirical research within some of the less heavily researched cells, and (3) to identify what seem to be major interesting gaps in the economic consequences literature.

Logically empty cells

Though one could conceivably construe an accounting research context for nearly every cell, some of the cells seem so far removed from the mainstream of accounting research that they are not likely to be of much interest. We assert that the following cells (row-column) are within this logically empty (null) category of cells with little interest for accounting research:

2-3	9-5
6-4, 5	11-4
7-2	14-3
8-3	15-3

Examples of extant and possible future research

This paper does not include an annotated bibliography for each cell. However, in order to add specificity to the cross-classification scheme we describe some examples of pertinent research for each cell which, in our opinion, could yield fruitful opportunities for research.

Cell	Description
1-1	By far the most research effort has been applied at the intersection of 'firms' as

suppliers of accounting information and 'among firms' by investors as agents for resource allocation among firms (cell 1-1). However, these efforts have stopped short of measuring the effects of capital resource allocation decisions on the wealth of the economy. Of course, the ready availability of data and well-known research technologies have contributed to the relative emphasis on capital market research. This and the following other relatively heavily researched cells are not pursued further here:

1-2, 3, 4, 5	7-1, 4, 5
5-1, 2, 3, 4	9-1, 2, 4
6-1, 2	10-1, 2

A number of other cells are omitted for further discussion because they represent less significant research opportunities:

3-4	7-3
4-4, 5	8-2, 3
5-5	11-3, 5
6-3	

- 2-1 Auditors, as suppliers of information, are cognisant of some of the potential effects of audit opinions. We suggest that stock price effects of various opinions need to be further investigated. Shank and Murdock (1978) have initiated research in this area concerning 'subject to' opinions.
- 2-2 Auditors and internal auditors supply information to managers within firms. Does this information have any economic consequences? Concern for this issue has lead people to question the justification for auditing services.
- 2-4 Auditors have long been concerned with the ethical issues of independence, ownership of work papers, and potential conflict of interest. Are the potential economic consequences large enough to justify this concern?
- 3-1, 2, Government agencies supply information to other agencies, and, in the USA, under
- 3, 4, Freedom of Information disclosures, to competitors and to other interested organisations. What is the economic impact of such disclosure on prices, on taxation, on revenue-sharing, and on other contract and grant negotiations? What are the possible consequences of US Cost Accounting Standards?
- 5

Table 1.
Cross-classification of Economic Consequences of Accounting Information

Table 1. Cross-classification of Economic Consequences of Accounting Information						
Those affected (foreign & domestic)	Resource Allocation		Economic Effects		Income Distribution	
	1. Among firms	2. Within firms	3. Between public and private sectors	4. Economic classes	5. Geographical location	
<i>Suppliers</i>						
1. Firms	Stock price effects of disclosure	Effects of cost allocation Performance evaluation Capital budgeting Bankruptcy prediction	Tax effects of disclosure	Value of insider information	Divisional performance evaluation	
2. Auditors	Stock price effects of opinions*	Effects of audits, internal audits*	Null	Ethics/conflict of interest*	Null	
3. Government agencies	Rate setting* Effect of cost accounting standards	Rate setting* Effect of cost accounting standards	Tax policies* Effect of cost accounting standards	Tax policies*	Revenue sharing* Contract awards	
4. Policy makers	Stock price effects of disclosure	Performance evaluation	Moss, Metcalf, etc.* Differences between tax and financial reporting	Justice, equity Welfare economics	Justice, equity Welfare economics	
<i>Users</i>						
5. Firms	Analysis of mergers, take-overs, etc. Bankruptcy	Performance evaluation Transfer pricing Organisational behaviour/organisational structure	Nationalisation	Pricing	Location analyses Pricing	
6. Auditors	Client development	Audit sampling	Moss, Metcalf, etc. Loan guarantees, subsidies, etc.	Null Transfer payments	Null Transfer payments	
7. Government agencies	Rate setting and contract negotiations	Null				
8. Policy makers	Effects of proposed disclosures*	Information costs and benefits*	Loan guaranties, subsidies, etc.	Effects of proposed disclosures*	Effects of proposed disclosures*	
9. Investors	Stock price effects Income smoothing	Divisional (segment) reporting Analysis of loan decisions	Risk-Return differentials*	Capital market imperfections Analysis of loan decisions*	Null Analysis of loan decisions*	
10. Creditors	Analysis of loan decisions	Labour negotiations*	Risk-Return differentials*	Null	Regional shifts in industry	
11. Unions	Labour negotiations*		Nationalisation	Scope of activities*	Scope of activities*	
12. Public interest groups	Effect of Council on Environmental Quality, Nader Scope of activities* Political sensitivity*	Scope of activities*	Big government versus private enterprise*	Political sensitivity*	Political sensitivity*	
13. Politicians		Political sensitivity*	Political sensitivity*	Social concerns for naive investors*	Scope of activities*	
14. Citizens	Scope of activities*	Scope of activities*	Null	Scope of activities*	Scope of activities*	
Others						
15. Unorganised workers and consumers	Scope of activities*	Scope of activities*	Null	Scope of activities*	Scope of activities*	

*Discussed in this paper and, in the author's opinion, the most crucial research areas.

- Very little research has been initiated in any of these areas.
- 4-1 Policy makers and other regulatory agencies are beginning to recognise the effects on stock prices of various disclosure requirements. Research studies in this area, with regard to successful efforts and full costing in the oil industry, have been numerous and contradictory.
- 4-2 A neglected area of research concerns the impact of regulatory requirements on organisational structure and performance evaluation within various divisions or subsets of firms. For example, do regulatory actions affect Return on Investment or Discontinued Cash Flows differentially? Selto (1980) has investigated this issue with regard to accounting for research and development.
- 4-3 In 1977 the US Senate released the report of the Metcalf Committee entitled 'The Accounting Establishment'. The main conclusion of this committee report was that financial accounting standards should be set by the federal government and not by the private sector. Research is needed to assess the economic implications of this radical proposal.
- 8-1, 4, 5 Policy makers and regulatory agencies both supply information and use information. A corollary research area involves the regulatory agency's use of information from a variety of sources in the evaluation of how *proposed* disclosures will affect firms, economic groups, or regions. Row 4 concerns actual disclosure requirements while Row 8 is an evaluation of possible consequences of alternative requirements.
- 8-2 This cell includes research on the costs of regulatory compliance and disclosure in comparison with any positive benefits that may occur to the firm. From the organisation's perspective, what is the net economic impact of regulation?
- 9-3 and 10-3 It has been argued that the combined (and controversial) effects of taxes, risk pooling or spreading and capital market imperfections may have serious impacts on the relative risk-return characteristics of public versus private investment. A neglected area of accounting research is in the assessment of public versus private investment risk-return characteristics and in the assessment of the impact of accounting disclosure on those risk-return characteristics.
- 10-4, 5 Creditors obviously use loan acceptance/rejection data to evaluate inter-firm and intra-firm credit-worthiness (cells 10-1, 2). However, we suggest that similar analysis include consideration of various economic classes and geographic locations. Real estate 'red-line' investigations are concerned with the equity of such geographic discrimination.
- 11-1, 2 Unions have become much more conscious of the financial statements of employers. The economic consequences of alternative disclosure requirements (including replacement costs) on labour negotiations have not been evaluated. That is, do changes in financial reporting lead to any bias for unions or for employers? This type of economic consequence could be of substantial magnitude. On the other hand, if the market for information is efficient, both sides will see through any non-substantive change in disclosure.
- 12-1, 2, 4, 5 These cells all concern the public's interest in economic organisations.
- 13-1, 2, 4, 5 They concern the question of whether such organisations should expand or contract their scale of activities.
- 14-1, 2, 4, 5 This cell, and to some extent cells 14-3 and 15-3, requires research on the economic consequences of different mixes of public vs. private enterprise. What is the impact, on GNP, of changing mix between public and private programmes?
- 12-3 This cell, and to some extent cells 14-3 and 15-3, requires research on the economic consequences of different mixes of public vs. private enterprise. What is the impact, on GNP, of changing mix between public and private programmes?
- 13-1, 2, 3, 5 Watts and Zimmerman (1978) and Dhaliwal (1979) have initiated research on the possible role which accounting information plays in determining the political sensitivity (e.g., the likelihood of government intervention) of firms. We agree that more studies are needed to establish these types of effects.
- 13-4 This research area (and possibly cell 4-4) suggests the need for investigating the economic consequences of the naive user syndrome. What are the consequences of including the naive investor, or the naive potential investor, as a source of concern

in determining financial reporting requirements? Should accounting policies continue to reflect concern for this large, but difficult to identify, group of people? What are the consequences of this course of action?

Summary

This paper has identified a variety of economic consequences that have, heretofore, been given short shrift by accounting researchers. Accounting information is broadly defined to include most types of publicly and privately available financial information.

We do not assert that this classification is perfect. Any classification scheme is open to the criticism that some topics do not fit and that others are ambiguous or may be assigned to several cells. Furthermore, our provider/user approach does not preclude the possibility that a single entity may be simultaneously a provider and a user of information.

Wherever appropriate, we have provided examples of extant research to illustrate particular cells. We have suggested possible topics where we have not found suitable examples. The purpose of the paper is to encourage readers to develop their own list of possible research topics in the area of economic consequences. We have identified the gaps that we believe are significant. Concerned readers may discover that other cells offer even more promise. We hope that the dialogue about

economic consequences will lead to definitive research results.

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Reasons for the Emergence of Contested Company Take-overs in the 1950s

J. B. Tabb

One of the most interesting financial developments in the United Kingdom was the emergence during the 1950s and 1960s of large scale take-overs of quoted companies. A particular feature of these post-war take-overs was the occurrence of numerous take-over bids which succeeded despite determined opposition from the offeree directors. The take-over technique goes back to at least 1835 when the National Provincial Bank acquired the North Devon Bank,¹ and there were some large companies taken over during the 1930s, but what does excite interest is why the use of take-overs should have increased so dramatically during the 1950s and 1960s. It seems that more than 9000 English companies were taken over in the period 1954–1970.² In the period 1954–63 more than 600 quoted companies were acquired.³ This paper is intended to explain why take-overs which were reported in obscure paragraphs in the press during the 1930s became main-page news in the 1960s.

Firstly, the pre-World War II take-overs were mostly mergers in that the offeror's terms were recommended to their shareholders by the offeree directors. Bids opposed by the offeree board succeeded only in very special circumstances, such as when compliance was forced on the objecting board by a third party.

Difficulties facing pre-1950 bidders

There were also formidable difficulties facing earlier take-over bidders. One was the lack of a statutory provision which would enable the gainer of nearly all a company's share capital

compulsorily to acquire the remainder. Successful bidders also sometimes had problems in removing incumbent directors, particularly managing directors, from office before completion of their contractual term. Clause 80 of Table A of the Companies Act 1929 did provide for the removal of any director before the expiration of his term of office by extraordinary resolution. However, the extraordinary resolution required a three fourths majority and if the directors had entrenched themselves with long-term service agreements, which in some cases were for life,⁴ then they were able to sue for wrongful dismissal if removed before the end of their contractual period, as was shown by a 1940 House of Lords decision.⁵

As dismissal of entrenched directors was obviously going to be expensive and compensation for loss of office awarded to directors by mutual agreement was not required to be disclosed, bidders found it preferable to settle with the offeree directors privately to gain their acceptance to the take-over offer. No details are available of these agreements but obviously shareholders might have been less willing to comply with their directors' recommendation to accept an offer had they been aware of the extent of the compensation offered to the board. The Companies Act 1948 not only required that such compensation be disclosed but also that it be sanctioned by the members.

The Cohen Committee on Company Law Amendment in 1945 recommended that 'there should be a provision, overriding anything to the contrary in the articles of a company, that any directors, whether under a service contract or not should be removable by an ordinary resolution, without prejudice to any contractual right for

¹J. F. Ashby, *The Story of the Banks* (Hutchinson, 1934) p. 160.

²*Economic Trends*, April 1963, p. iv; *Economic Trends*, November 1965, p. xxiv; *Financial Statistics*, December 1972, p. 135; *Financial Statistics*, December 1974, p. 96.

³*Economic Trends*, April 1963 p. iv; *Economic Trends*, April 1965, p. xxiv.

⁴L. C. B. Gower, *The Principles of Modern Company Law* (Stevens & Sons, 2nd, ed., 1957) p. 124.

⁵*Southern Foundries (1926) Ltd v Shirlaw* [1940] 2 All E.R. 445.

compensation'.⁶ There was also a tendency for shareholders to heed their directors' advice to a greater extent than in recent times making it almost impossible to gain acceptance for a bid from the majority of the shareholders if contested by their board.

Limited nature of pre-1950 take-overs

Such obstacles progressively disappeared between 1929 and 1948, paving the way for new take-over techniques. Prior to the Companies Act 1948 these were restricted to four basic types. In order to appreciate the changes introduced in the 1950s it is worthwhile studying these four classes.

The first was the take-over of a company by gaining election as Chairman, without offering for the ordinary shares. This was George Hudson's method. He established a reputation as the nineteenth century Railway King by selecting a railway company with declining profits, purchasing some stock in the company and then attending a General Meeting where he would expound a scheme to increase profits if the shareholders were to replace the current board with himself and his friends. For instance Hudson acquired control of the North Midland Company in 1842 by promising, if given control, to reduce the line's working expenses from £44,000 to £27,000 a year.⁷ 'When at last he sat down a babel of voices was at once heard, from shareholders moving all kinds of fiery resolutions in favour of his plans.'⁸ The majority of the board resigned a week later and Hudson assumed control. Similarly, dissatisfied shareholders in the Eastern Counties Railway elected Hudson to their board after the dividend had been cut to only one percent.⁹ Although Hudson obtained absolute control of these companies he did not make an offer for the shares, and when later forced to resign as Chairman, he lost his influence and his wealth. Hudson's example does not seem to have been followed in Britain, probably because the staggering of directors' elections makes it too difficult, but it has been frequently used in the United States.

A second form was the acquiring of a company with the approval of its board. Such take-overs, which were really amalgamations, were the most common prior to 1950 and of course attracted little public notice. Sometimes the merger was

mutually advantageous, sometimes it was the case of an unsuccessful firm being willingly acquired by a more successful rival and on occasion the consent of the offeree company's directors was obtained by paying them generous compensation for their loss of office. Amalgamations of banking and insurance companies in the 1850s and 1860s were so extensive that at least a dozen resulted in litigation, in one case¹⁰ because the offeree directors had not considered it necessary to consult their shareholders before accepting the offer. There were numerous mergers and take-overs in the brewery industry between 1900 and 1939, the absorbed firms being mainly the relatively unsuccessful ones operating costly plant, or making a less popular brew or losing business through population shifts. In most cases they were acquired by more successful competitors who wanted, not the breweries, but the tied houses. There were 4,500 breweries in Britain at the beginning of the century; by 1950 there were fewer than 600.¹¹

There were numerous take-overs in the motor industry during the 1920s and 1930s but these, too, mostly comprised the absorption of failing companies by their rivals. For instance, the acquiring of Bentley Motors by Rolls Royce, BSA's take-over of Lanchester and Morris's buying of Riley can only be explained by the desire to acquire the name of a pioneer in the industry with its consequent goodwill.¹² Banks have used take-overs as a means of geographical expansion since the early nineteenth century. National Provincial Bank, now merged into National Westminster, started in the 1800s, acquiring the North Devon Bank in 1835, then Skinner and Co. in 1836, Husband and Co. in 1839, Harris and Co. and the Dover Bank in 1840, Coke Holroyd and Co. in 1842 and Bideford Old Bank in 1843. National Provincial continued to expand by take-overs until 1924.¹³

The third form was the acceptance of a bid because of pressure exerted by a third party. On one occasion the pressure was that of a trading bank. Dorman Long's bid for Bolckow, Vaughan and Company in 1929 was rejected by the offeree board because the directors, though unable to pay a dividend for eight years, were reluctant to lose

⁶Report of the Committee on Company Law Amendment, (HMSO, 1945) para. 130.

⁷R. S. Lambert, *The Railway King* (George Allen and Unwin, 1964) p. 73.

⁸*Ibid.*, p. 75.

⁹*Ibid.*, pp. 161-162.

¹⁰In *re Bank of London Assurance Association* 10 Eq 622.

¹¹William Mennell, *Takeover* (Laurence and Wishart, 1962) p. 43.

¹²P. L. Cook and R. Cohen, *Effects of Mergers* (George Allen and Unwin, 1958) p. 374.

¹³*Stock Exchange Official Year Book* (Thomas Skinner, 1961) p. 367.

the firm's historic identity. Barclays Bank compelled acceptance of the Dorman Long offer by making the renewal of Bolckow Vaughan's overdraft conditional on the merger taking place.¹⁴

Further take-overs of this type were the result of Lord Norman's policy of rationalisation when he was Governor of the Bank of England. During the 1920s the steel industry incurred serious financial difficulties causing it to become increasingly dependent on banks so that eventually the Bank of England became involved. Norman turned to rationalisation as a means which would relieve the Government of the necessity for intervention.¹⁵ Rationalisation, the current panacea, was based on the theory that a large, well-organised firm could achieve economies of scale and that the competition of small industrial units was wasteful. In practice it usually meant concentrating production in the most efficient factories while closing down the least efficient.¹⁶

The first of the take-overs resulting from Norman's policy was that of Armstrong-Whitworth. Armstrong-Whitworth dealt with the Newcastle branch of the Bank of England, which had provided finance, not only for its main business of building capital ships but also new ventures such as commercial shipbuilding and a pulp and paper manufacturing plant in Newfoundland. This diversification was intended to reduce the company's dependence on capital ships. When Britain stopped buying these after the Washington Naval Conference in 1921-2, Armstrong-Whitworth was deprived of its main source of income before it had time to develop the new ventures to a profitable conclusion.¹⁷ When Armstrong-Whitworth's indebtedness to the bank reached £6,500,000, Norman persuaded Vickers to acquire Armstrong-Whitworth, the bank accepting shares in Vickers-Armstrong in exchange for its £5,000,000 of debentures in Armstrong-Whitworth.

Norman also became involved in the problems of the cotton industry when severe competition from Japan and India in the 1920s forced the British cotton mills to reduce their selling prices below cost. A high proportion of the mills had been formed on the basis of half their capital in shares, the rest being short-term loans and bank

advances, leaving these companies with commitments for large interest payments.¹⁸ Further, it was usual for these companies to call up about one quarter of the capital initially,¹⁹ the balance being used as security for overdrafts. As the cotton mills' position worsened this unpaid capital was called; during 1930 for instance 81 cotton mills made calls involving more than £3,000,000.²⁰ Eventually the situation became so serious that Norman had to bring the Bank of England to the assistance of those banks which had extended overdrafts to the mills. This assistance took the form of Bank of England financial backing for the Lancashire Cotton Corporation which then acquired the majority of those mills most heavily indebted to the banks.²¹

The fourth form of take-over involved persuading an offeree board to withdraw its initial opposition. There were bids prior to 1950 which succeeded despite the offeree board's hostility, usually because the bid represented a recognisably high price. For instance, in 1906 the English soap manufacturers suffered a downturn in sales, simultaneously with an increase in the price of vegetable oil caused by the competing demands of the margarine industry. William Lever tried to organize a soap manufacturers' combine which would agree to pass on the higher costs by raising prices, reducing advertising and accepting the consequent lower sales. Because of the Northcliffe newspapers' sustained opposition, the soap combine collapsed so Lever had to turn to alternative means.²² Instead of persuading his competitors to a common course Lever began to take them over.²³

One of the 1920 take-overs, that of John Knight Ltd., illustrates the exceptional generosity of the consideration Lever was prepared to pay to ensure acceptance. The John Knight Chairman said of the offer for his company: 'Notwithstanding the very strong and satisfactory position of the company and its prospects, I feel it is my duty to point out to the ordinary shareholders that under our existing constitution it would be difficult, if not impossible, for us to pay a dividend of 25% on the ordinary shares....'²⁴ He then rec-

¹⁴J. C. Carr and W. Taplin, *History of the British Steel Industry* (Blackwell, 1962) p. 449.

¹⁵Sir Henry Clay, *Lord Norman* (Macmillan, 1957) p. 358.

¹⁶Sir Charles G. Renold, 'Rationalisation of the Management of Companies Under a Merger', in *Studies in Accounting* (Sweet and Maxwell, 1950) pp. 184-202.

¹⁷J. C. Carr and W. Taplin, *History of the British Steel Industry* (Blackwell, 1962) p. 442.

¹⁸*The Economist*, 31 March 1928, p. 634.

¹⁹*The Economist*, 27 August 1927, p. 350.

²⁰*The Economist*, 10 January 1931, p. 60.

²¹Sir Henry Clay, *Lord Norman* (Macmillan, 1957) pp. 335-7.

²²Charles Wilson, *The History of Unilever* (Cassell, 1954) Volume 1, p. 73.

²³*Ibid.*, p. 88.

²⁴P. L. Cook and R. Cohen, *Effects of Mergers* (George Allen & Unwin, 1958) p. 237.

commended his shareholders to accept the offer, which virtually guaranteed a return of 25%.

Another method used to persuade reluctant directors to withdraw their opposition to a bid was the offer of generous compensation for loss of office. Prior to the passing of the Companies Act 1948 this was quite legal and neither the amount nor the fact of compensation needed to be reported. The Cohen Committee reported that this practice was not uncommon and on occasion abused.²⁵ These techniques avoided a protracted struggle between the bidder and the offeree company's board. It was not until the passing of the Companies Act 1948 that bidders were able, on a large scale, to wrest control of companies through by-passing their boards.

Weakening of the relationship between shareholders and their directors

By 1945 a very special position had been reached. A dichotomy had developed between management and shareholders. In the early days of companies there had been a much closer relationship between shareholders and their directors. For instance, the shareholders in the first railway companies frequently took a personal interest in the policy and management of their lines.²⁶ The Great Western Railway proprietors were able to decide new salary scales²⁷ for their employees and instruct the directors to undertake no further extension or amalgamations.²⁸ But this shareholder participation gradually lessened because of a number of factors.

Shareholders took more interest in annual meetings in the days when dividend rates frequently fluctuated, sometimes dramatically, from year to year, mirroring profit fluctuations, being perhaps ten per cent one year and nothing the next. The introduction of the principle of withholding a portion of earnings each year so as to enable the payment of dividends at a future time, despite falling profits, lessened shareholders' interest in annual meetings and blunted the incentive to appoint investigating committees to report on their directors' management.

As the joint-stock companies grew in size they also tended to draw their shareholders from wider

geographical areas so that a larger proportion of these absentee owners found it inconvenient to travel to company meetings. Inheritance of shares meant the larger holdings tended to be broken up into smaller less significant lots, and the beneficiaries often did not have the same interest in the company as the original owner of the shares.

While the shareholders were losing their desire to participate in company policy making, an independent influence was being exerted on directors which led to a weakening of the links between boards and the general body of shareholders. Management has sometimes appeared anxious to emphasise the fact that legally the company is a separate entity from its shareholders, persuading directors they must consider interests additional to those of the shareholders.

Another cause of the widening gulf between shareholders and directors was the directors' not infrequent policy of reducing the shareholders' power to overrule boards' decisions on questions affecting the management of companies. In the latter part of the nineteenth century directors started inserting clauses in their company's articles empowering themselves to manage the company without the possibility of being overruled by shareholders in general meeting and the Courts proceeded to uphold such provisions with increasing emphasis. In 1906 in *Automatic Self-Cleansing Filter Syndicate Company v. Cuninghame*²⁹ the Court held directors were not agents of the shareholders and so could ignore a company resolution instructing them to affix the company's seal to a contract for sale of the company's assets. This principle was confirmed in later cases,³⁰ until the stage was reached in 1943 when the Court decided a provision in articles authorising directors to manage the company without interference from the shareholders prohibited shareholders appointing a firm of accountants to investigate the financial affairs of the company and prepare new accounts if they thought necessary.³¹ By 1948 it had been, therefore, firmly established that directors, when authorised by the articles, had the undisputed right to manage the company's affairs and the shareholders had no part in policy making. The pos-

²⁵Report of the Committee on Company Law Amendment (HMSO, 1945) para. 92.

²⁶M. Robbins, *The Railway Age* (Routledge & Kegan Paul, 1962) p. 102.

²⁷E. J. MacDermot, *History of the Great Western Railway* (Ian Allen, 1964) Volume 1, pp. 160-1.

²⁸*Ibid.* p. 13.

²⁹[1906] 2 Ch. 34, C.A.

³⁰*Horn v. Faulder (Henry) and Co.* (1908) 99 L.T. 524; *Salmon v. Quin and Axtens* [1909] 1 Ch. 311, C.A.; *Logan (Thomas) v. Davis* (1911) 104 L.T. 914, C.A.; *re Oldfleet Shipbuilding and Engineering Co.* [1922] I.R. 26; *Shaw (John) and Sons (Salford) v. Shaw* [1935] 2 K.B. 113, C.A.; *Grundt v. Great Boulder Proprietary Gold Mines* [1948] Ch. 145, C.A.; *Gramophone and Typewriter v. Stanley* [1908] 2 K.B. 89, C.A.

³¹*Scott v. Scott* [1943] 1 All E.R. 582.

ition was expressed in Halsbury's *Laws of England* thus: 'If, as is usual, the management of the company's affairs is entrusted to the directors by the articles of association... the entire management of the company, including its financial direction, rests solely in the hands of the directors, and accordingly resolutions by the company in general meeting purporting to interfere with this management are invalid.'³²

Boards have also become progressively less dependent on their shareholders as a source of funds as alternative ways of raising capital have been developed. Where directors approach their shareholders for a new capital issue they are required to offer them an explanation of the purposes to which the new funds will be put. This is also true of new issues to the general public. However, if funds can be obtained from other sources, the explanations are given to those providers and not the shareholders, so that the position has eventually been reached where firms are obtaining most of their new funding from banks and insurance companies, and so these parties are obtaining information about management's policies and operations that is not required to be disclosed to the shareholders. Another source of independence for directors was financing by undistributed profits. Undistributed profits represent an investment of further capital in the company by shareholders but it is not necessary for the directors to gain the shareholders' consent to this decision as most companies' articles provide that shareholders can approve a dividend rate which is less than that recommended by their board but not a rate exceeding the recommendation. This ability to raise funds from shareholders without their positive consent further strengthened the directors' independent position.

By 1945, then, it was firmly established that directors had the undisputed right to manage the company's affairs and the shareholders had no part in policy making. The shareholders' sole remaining power was to replace directors but this was a drastic remedy, and therefore difficult to implement, particularly as most elections were staggered so that it could take several years to change the majority of a board. Shareholders had, therefore, by 1948 been mostly reduced to a passive role. This more detached attitude of the shareholders made them more willing to accept offers for their shares, but there was still limited opportunity for anyone to take advantage of this situation because there was little point in acquiring a

majority of a company's shares if the directors had long service agreements with it which could not be terminated. It was the Companies Act 1948 which provided an opportunity to exploit this division between shareholders and management.

Removal of some of the obstacles to bidders

Another problem initially facing take-over bidders was that a bidder who had obtained the acceptance of nearly all a company's shareholders had not, until 1929, powers to acquire compulsorily the shares of dissenting shareholders. This meant that a bidder, intending to acquire a company so as to improve its profitability, faced the prospect of being forced to share the results of his better management with a minority who would be contributing little of the capital and none of the managerial skill. The Companies Act 1929 provided that where the holders of 90% of the share capital in a company had accepted an offer for their holdings the successful bidder could compulsorily acquire the shares of the dissenting minority on the same terms as those accepted by the majority.³³ This was judicially examined in 1933 in *re Hoare and Co.*³⁴ where the Court held that the dissenting shareholders' shares could be compulsorily acquired even though they would suffer a reduction in income as a result. It was still open to dissident shareholders to appeal to the Courts against the compulsory acquisition of their shares if the bid price they were being forced to accept was 'unfair' but the Courts tended to regard as fair any offer exceeding the market price per share prior to the bid. However, minority shareholders continued to appeal against this rule as not being always valid, and in one case achieved a temporary success. When in 1947 Metal Box Ltd's offer for Press Caps Ltd succeeded, some minority shareholders appealed against the compulsory acquisition of their shares on the grounds that the bid price was not fair even though it exceeded the market price of the shares, because the market price had been depressed by the understatement of Press Caps' assets in the balance sheet. The Press Caps accounts for 1947 showed freehold property at £29,349 whereas the agreed market value was in the neighbourhood of £90,000. Vaisey, J. made an order in favour of the applications because 'If you find admitted so large a discrepancy as an undervaluation of the most

³²Halsbury's *Laws of England*, 3rd. ed., 1954, Vol. 6, p. 298.

³³Companies Act 1929, section 155.

³⁴[1933] All E.R. 105.

important asset in the balance sheet of this company, an admitted undervaluation of no less than £60,000, I should have thought that threw a great deal of doubt on the appropriateness of the balance sheet as an estimate of value, and through that, therefore, it also threw doubt on the market prices of the shares.³⁵ The Court of Appeal reversed this decision on the grounds that the figures in the balance sheet were not a valuation and did not purport to be.³⁶ As late as 1967 minority shareholders were still contesting the compulsory acquisition of their shares³⁷ but by 1949 it would seem that it had been established that the onus of proof of an offer's unfairness lay with the appealing minority shareholders and the failure of balance sheet figures to represent current worth was not proof that the market price prior to the bid had been an unreliable indicator of the fair price.

Take-over bidders were further helped by the fact that shareholders often did not fully comprehend the basis on which the financial statements were prepared. Because a company balance sheet was prepared on the basis of historical costs, as a statement of its sources and the manner in which they had been disposed, this did not, during a period of inflation, represent the current market value of the firm's assets. As a result some shareholders were only too willing to accept an offer which exceeded both the current stock exchange quotation and the book value per share even though it represented considerably less than the current resale value of the company's assets. For instance, as late as 1945 the Manchester Royal Exchange balance sheet showed the company's land and property at their cost in 1912.³⁸

Accountants also tend to estimate company profits conservatively so as to provide for unforeseen contingencies. This has been encouraged by a chain of legal decisions since 1889 when in *Lee v. Neuchatel Asphalte Co.*³⁹ Lindley J. stated that the calculation of profits should be left to the commercial world and what was to be put into a capital account and what into an income account should be left to men of business.⁴⁰ Some managements carried this to the extent of deliberately understating profits by transferring some earnings to secret reserves instead of disclosing them as income. This policy was also accepted by the

Courts beginning with *Newton v. Birmingham Small Arms* in 1906⁴¹ where it was decided that 'The purpose of the balance sheet is primarily to shew that the financial position of the company is at least as good as there stated, not to shew that it is not or may not be better.'⁴²

Other glaring examples of discrepancies between values as disclosed in the accounts and current market worth are to be found in the treatment of trade investments. *The Times* in 1938 instanced two understatements: Associated Portland Cement Manufacturers' trade investments in British Portland Cement Manufacturers appeared in the Associated Portland balance sheet at a figure which was £5,000,000 less than the current market value⁴³ and The Burmah Oil Company's holdings in Anglo-Iranian Oil (later name changed to B.P.) which appeared in the books of Burmah Oil at £5,343,000 had a market value exceeding four times that.⁴⁴

There were, therefore, many companies which calculated their profit on a conservative basis and stated their fixed assets at an historical cost figure considerably less than their current market value. At the same time, as the Press Caps' case showed, there were shareholders who did believe the balance sheet was a guide to the net asset value of their company.⁴⁵ This combination of circumstances was not only of major assistance to take-over bidders, but, particularly during a period of inflation, it provoked bids.

By 1945, then, a situation had been reached where some of the obstacles to take-overs had been removed and the divorce between management and shareholders established while the accountants' conservative policy of valuing fixed assets at historical cost did not always provide members with an accurate estimate of their company's net worth. These were factors which could be exploited by bidders and by 1945 take-overs were no longer a novelty, having been made on numerous occasions during the preceding 100 years, and many of the bidders' tactics had been developed and implemented so that the take-over was a well-tested technique for achieving a variety of objects. Lever resorted to take-overs as a means of maintaining prices, Nuffield to obtain skilled management,⁴⁶ General Motors and Procter and Gamble as a quick way of establish-

³⁵*re Press Caps Ltd* [1949] 1 All E.R. 1013.

³⁶*Ibid*, 1015.

³⁷*Grierson, Oldham & Adams Ltd* [1967] 1 All E.R. 192.

³⁸*The Times* 11 January 1961, p. 12.

³⁹41 Ch. D. 1, C.A.

⁴⁰*Ibid* at 21.

⁴¹[1906] 2 Ch. 378.

⁴²*Ibid* at 384.

⁴³*The Times*, 27 January 1938, p. 17.

⁴⁴*The Times*, 28 May 1938, p. 19.

⁴⁵*re Press Caps Ltd* [1949] Ch. 434, C.A.

⁴⁶P. W. S. Andrew and Elizabeth Brunner, *The Life of Lord Nuffield* (Basil Blackwell, 1955) pp. 125 and 155.

ing themselves as British manufacturers, while the banks used take-overs for geographical expansion.

Major importance of the Companies Act 1948

In 1938 there were, apparently, eight quoted companies taken over⁴⁷ and only four in 1939⁴⁸ and two in 1945,⁴⁹ but by 1945 the conditions had been created where take-overs would become more numerous if only the successful bidder had a ready means of removing an unwilling board after gaining control of the majority of the voting shares. This power was to be provided by the Companies Act 1948.

New provisions in the 1948 Act made it necessary to disclose any sums paid to directors of an offeree company by the bidder, so ending the possibility of gaining directors' approval for a take-over by paying undisclosed sums as compensation for loss of office. The Cohen Committee recommended that such payments should be disclosed to members of the company and sanctioned by them. These recommendations were incorporated in section 191 of the Companies Act 1948.

But while the 1948 Act closed this avenue it opened the door for another, more important, technique, that of by-passing an offeree board. Before 1948 this was not always practicable because it was sometimes difficult to remove, during their tenure of office, directors appointed for a definite period.⁵⁰ Also, such removal required an extraordinary resolution, that is a 75% majority, under clause 80 of Table A of the Companies Act 1929. After the 1948 Act all that was required for removal of a director was an ordinary resolution, that is a simple majority, notwithstanding anything in the company's articles or any agreement between it and him.

The Companies Act 1948 was more revolutionary in its effects than has perhaps been realised. The most noticeable thing about take-overs prior to 1948 is there do not appear to have been many successful contested take-overs. In those cases where a bid succeeded, the directors either recommended it or else felt it was so generous they

could not sustain opposition to it. Before 1948, where the directors of an offeree company expressed strong opposition to a bid it was immediately withdrawn.

But this was not the case after the 1948 Act. For the first time, bidders were able to appeal directly to the shareholders over the opposition of the board, so that take-overs became much more numerous in the 1950s and the contested ones attracted considerable public attention. Perhaps the major reason for this marked increase in take-overs during the 1950s was that the possibility of this new technique coincided with circumstances which made shareholders more inclined than previously to accept a take-over offer.

Factors which made shareholders more inclined to accept an offer

One circumstance was the small number of dividend increases in the 1950s despite inflation, partly because of the Government's dividend restraint and partly because of the uncertainty of replacement costs for new plant in a period of increasing prices. Because of the difficulty of accurately predicting replacement costs, prudent directors tended to adopt a cautious dividend policy. An indication of the size of this problem was provided by the Chairman of Renong Tin Dredging Ltd. when he disclosed that a tin dredge costing £150,000 in 1938 required £300,000 in 1956 merely to re-equip.⁵¹ One consequence of this caution was that J. Sears and Co. (True-Form Boot Co.)'s dividend of 22½% was covered five times by earnings in 1953 at the time of Clore's bid.

Another cause of dividend restraint was Government fiscal policy in the 1950s. After the war Government replaced the National Defence Contribution with a discriminatory Profits Tax. Where the undistributed profits for the year were less than the total profits of the business for the year, the profits tax would be reduced by an amount equal to 15% of the difference,⁵² while conversely if the undistributed profits in any period exceeded the profits earned during that period the profits tax was increased by an amount equal to 15% of the difference. This differential was changed in successive budgets so that by 1956 it had been increased to the extent that profits tax on distributed profits was 30% but on retained earnings only three per cent.⁵³ The consequent

⁴⁷*The Stock Exchange Official Year Book 1939* (Thomas Skinner) pp. 850, 1244, 1342, 1408, 1492, 1561, 2160 and 2939.

⁴⁸*The Stock Exchange Official Year Book 1940* (Thomas Skinner) pp. 599, 702, 1557 and 2878.

⁴⁹*Register of Defunct and Other Companies Removed from the Stock Exchange Official Year Book 1975-6* (Thomas Skinner) pp. 44 and 536.

⁵⁰*Halsbury's Law of England* 2nd, ed., 1932 Vol 5, 343.

⁵¹*The Times*, 12 November 1956, p. 17.

⁵²Finance Act 1947, part IV, section 30 (2).

⁵³Finance Act 1956, section 29.

dividend freezes also froze share prices. The *Financial Times* index of leading ordinary shares which was 100 in 1935 was still only 105 in 1952. Realising that their undistributed dividends would not be available until the end of the period of Government dividend restraint, many shareholders were prepared to accept any bid which exceeded the market price of their shares by a reasonable margin. These shareholders were quite correct in their decision because acceptance of such an offer enabled them to receive at least some of their withheld dividends in the form of a tax free capital gain. Government policy, therefore, unintentionally increased the potential for take-overs.

But a generous price was not the only induce-

ment bidders had to offer: it was a refreshing experience for shareholders to be canvassed for their support and treated as the owners. Take-over bidders courted shareholders with an intensity, and in some cases a quantity of information about their company never provided by their directors.⁵⁴ At a time when some chairmen were treating shareholders as an irritant and even brusquely refusing to answer their questions at annual meetings⁵⁵ the bidders restored the shareholders to the position of owners, giving them a chance to exert a power they had almost forgotten existed.

⁵⁴R. W. Moon, *Business Mergers and Take-over Bids* (Gee and Co., 1960) p. 140.

⁵⁵*Minutes of Evidence Taken Before the Company Law Committee* (HMSO, 1961) p. 322.

Book Reviews

Official Record of the Proceedings of the Congress of Accountants. 1904. 231 pp. \$15.

The Profession of a Chartered Accountant and Other Lectures. *Francis W. Pixley*, 1897. 272 pp. \$18.

Reminiscences. *Gérard Van de Linde*. 1917. 434 pp. \$25.

Professional Accountants. *Beresford Worthington*, 1895. 127 pp. \$12.

All reprinted by the Arno Press, 1978.

The four books under review were originally published in the period 1895 to 1917 and provide useful insights into accountancy in the late 19th century. Pixley and Van de Linde were leading practitioners and Worthington one of the first to write about professional accountancy.

The Congress of Accountants held in Saint Louis in 1904 brought together many leaders of the new profession. Notable among the presenters of papers were such pioneers as, in alphabetical order, Arthur Lowes Dickinson, James Martin, Robert H. Montgomery, John Ballantine Niven, Francis William Pixley, Walter A. Staub, Joseph Edmund Sterrett and George Wilkinson.

The Official Record was compiled with wit and humour. For example:

The Reception was not over until after midnight. The guests left the room reluctantly long after the orchestra had played 'God Save the King', 'The Star Spangled Banner', 'America' and several other patriotic airs, also 'Home, Sweet Home', none of which had the desired effect of sending the guests home (p. 81).

Arthur Lowes Dickinson provided a summary of 'the sound accounting principles for the determination of Profits' (p. 175), viz:

- (1) All waste, both of Fixed and Circulating Assets, incident to the process of earning Profits by the conversion of Circulating Assets must be made good out of the Profits earned.

- (2) Profits realized on sales of Fixed Assets should be first applied to make good estimated depreciation (if any) in other Fixed Assets not resulting from the ordinary conduct of the business. If there is no such depreciation, such Profits may be distributed as dividends, but should be distinguished from the Operating Profits.

- (3) A sufficient surplus should be accumulated (in addition to the provisions required to maintain Wasting Capital Assets under Clause I) for the purpose of making good Losses due to shrinkage in values of Fixed Assets arising from causes other than the ordinary operations of the Company.

He also argued strongly in favour of consolidated earnings statements (pp. 189–191).

James Martin complained that Australia was diminated very largely by the working classes, and the working classes of Australia having nothing in common with professional men, they had brought to naught efforts to organise the profession there (p. 105). Martin's role in organising accountancy throughout the English-speaking world deserves extended study.

Pixley read a long paper on the duties of professional accountants in connection with invested capital both prior to and subsequent to the investment. He was conscious of his status as a pioneer:

Proud as are the members of some professions of their antiquity, of customs carefully preserved although in many instances out of date, yet to assist in the establishment of a new profession, to feel you are one of those helping to form the professional character of those to follow in your footsteps, to be, in fact, one of the fathers of a profession, appeals to me, as I am sure it does to you, more than to merely step into the shoes of those who have gone before, and to follow a beaten path out of which it is unwise to stray (p. 122).

He stressed the importance of the events in 1866—the failure of Overend Gurney & Co. and other financial institutions—in encouraging the replacement of shareholder auditors by professional accountants (p. 134).



Pixley attended the First International Congress as immediate past president of the Institute of Chartered Accountants in England and Wales. He was in his early fifties and at the peak of a successful career. *The Profession of a Chartered Accountant*, first published in 1897, reprints revised versions of papers originally delivered by him between 1883 (two years after his pioneering book on auditing of 1881) and 1896.

His papers stress the importance of auditing and the links of the accountancy profession with the law. He was concerned about the legal and social status of the profession:

Let the Charter granted to us by the Privy Council in 1880 after long deliberation be upheld. It may be true, in fact I admit it is true, that some incapable Auditors are numbered in our ranks. This is because it was felt to be unfair to exclude anyone who at the date of the Charter was in practice; but they are going one by one, and every year makes us as a body more efficient, the Charter requiring that those who aspire to enter the Institute shall have a long special training.

Those who have been articled to our members since the date of the Charter come from the same class as do those who are now at Woolwich, Sandhurst, and the Inns of Court. They have been educated at the same class of schools, and, in addition, they have had a special education in the duties of Auditors (pp. 127–8).

He opposed the expansion of the public sector: 'It is difficult to see where this rage for creating new Government departments is to cease' (p. 206).

Pixley was not an original thinker. The importance of his writings is the insight they give us into the accepted theory and practice of his time.

Van de Linde's *Reminiscences* are disappointing. They tell us much about his travels and holidays but very little about the early practice of accounting. He was born in London in 1840 of Dutch descent, beginning work in the City of London in the late 1850s, starting his career as an accountant in 1875 and opening his own office in 1877. The firm he founded is now part of Ernst & Whinney. He was a prolific writer.

A few of his anecdotes tell us something about the early practice of accountancy:

On leaving Mr. Walton that day I ran across an old acquaintance, who thus accosted me: 'I have been looking for you, Mr. Van de Linde; I

want you to help me promote a company, of which you will be auditor.' To which I replied: 'Thanks, but my business is to wind up and not to promote companies.' To which he replied: 'Well, then, I have the very thing for you. You promote and audit my company this year, and next year you wind it up.' I gave the scoundrel a scathing sneer, and left him without a word (p. 183).

On 11 May 1880 the Institute of Chartered Accountants in England and Wales was established by Royal Charter. All accountants who had been in continuous practice for five years prior to that date were at once admitted as Fellows, while those who had been in continuous practice for three years (myself among the number) were similarly admitted as Associates (p. 212).

Beresford Worthington's little book *Professional Accountants* (1895) is still well worth reading. Worthington wrote as an outsider: 'the writer, whether to his disadvantage or otherwise, is in no way connected with any Association of Accountants'. He reprints as useful appendices Charles Snell's *Observations made up on examining the books of Sawbridge & Company* (1721); extracts relating to accountants from Holden's Triennial Directory of London for 1799 and 1822–4; and the number of companies, with authorised capital, registered from 1863 to 1893.

Writing in 1895 he devotes more attention to accountants as official liquidators and trustees in bankruptcy than as auditors and does not mention taxation work. Without mentioning names he shows clearly how the 19th century founders of the chartered and other bodies created a new profession.

The Arno Press and its editors are to be congratulated for making these books once again available to us. May they continue their good work for many years to come!

University of Exeter

R. H. Parker

Building Societies and the Consumer. *Marianne Rigge and Michael Young.* National Consumer Council, 1981. 77 pp. £3.00.

The purpose of this report to the National Consumer Council is to persuade, and the authors approach this in a thorough manner. At the end of their report they present 22 recommendations on building society practices and behaviour. These

cover a wide range of topics relating to factors which are thought to benefit the consumer, here defined as both existing and potential borrowers for house purchase from building societies as well as depositors.

One set of recommendations relates to the promotion of competition both between societies themselves and also between building societies and other financial institutions. A second set relates to the provision of greater information to borrowers and applicants for loans. The remaining recommendations relate to the avoidance of discrimination on the grounds of race and sex and the provision of special arrangements to help disadvantaged groups.

As a generality the aims are likely to receive widespread support. However, several of the recommendations deserve closer scrutiny. Furthermore, the presence of a recommendation does not of itself imply that societies are in fact not doing what is recommended—this applies particularly to remarks relating to racial discrimination. The evidence used in forming the report consists of two sorts: the traditional 'objective' data obtained from published statistical sources and secondly the results of a series of interviews undertaken with a number of building society managers, solicitors, estate agents and mortgage brokers. This latter source of information, at the authors' own admission, cannot hope to be representative. Nevertheless considerable use is made of the respondents' opinions in forming the conclusions of the report.

There are three individual recommendations to which it is instructive to draw attention. The authors are highly critical of the relationships between 'professionals', by which they mean mortgage brokers, valuers, estate agents, solicitors and even builders, and the societies and recommend that the whole system be investigated by the Monopolies Commission 'and that meanwhile the professional bodies concerned, such as the Law Society, should each consider how far they can put their own houses in order.' While there is some substance in their worries, the authors seem to reject much of the rôle of intermediation and the rôle of professional services in a commercial environment. It is analogous to the objections which have often been made to the size of retailers' margins by those who fail to value the cost in petrol let alone the cost of time spent in finding the cheapest and most suitable supplier.

The second recommendation to which I would draw attention is 'that the NCC should make a review of the structure of housing finance with a

view to phasing out subsidies and concessions both to owner-occupiers and council tenants in the interest of all consumers in the field of housing.' This is an amazingly sweeping statement on a subject where there has been a large quantity of research over the years; no mention appears to be made of the Green Paper on *Housing Policy*, Cmnd 6851 (1977) and its excellent *Technical Volume*.

I have much more sympathy with a third recommendation, that at the next Budget the composite tax rate system should be abolished and interest paid gross by societies. The composite rate by deducting a common rate of tax for all investors has a clear administrative convenience, but it discriminates against non-tax payers and in favour of tax payers as it is not reclaimable. One might argue that it is well advertised and hence it is a voluntary tax on 'non-tax payers' but it does represent a competitive advantage for building societies over other takers of retail deposits, such as the clearing banks.

It should be clear from these examples that the report has many thought-provoking and interesting ideas. However, the evidence adduced is in some cases rather limited and the conclusions sweeping. No doubt building societies will find some of its assertions highly contentious and a vigorous defence of many practices can be expected.

The report was commissioned by the National Consumer Council and in the Foreword Michael Shanks, the Council's Chairman, writes:

This is the report from the Mutual Aid Centre: it is MAC's work and the recommendations are theirs. We are anxious that there should be the fullest possible discussion of the issues which MAC have raised. We welcome comments from all quarters about what MAC have said and about what they have recommended. In the light of that comment we shall decide what action we shall take ourselves.

It is to be hoped that there will indeed be widespread informed comment.

National Institute of
Economic and
Social Research

David G. Mayes

Extent of Audit Testing. Canadian Institute of Chartered Accountants, 1980. v + 163 pp. \$19.50.
Limited Audit Engagements and the Expression of Negative Assurance. J. A. Milburn. Canadian Institute of Chartered Accountants, 1980. 262 pp. \$27.50.

I found the Research Study on Extent of Audit Testing to be useful but a little disappointing and the Study on Limited Audit Engagements to be extremely good. I suspect this is connected with the fact that the first is the product of a Committee whereas the second is written by an individual (Dr. Milburn) with the support of an Advisory Group.

The Study on Audit Testing starts by identifying a problem—a lack of uniformity in the selection of audit samples in identical circumstances—and sets out to provide guidance to external auditors as to the extent of both substantive and compliance testing (other than analytical review) in order to meet auditing standards of evidence. It includes a survey of current practice which demonstrates the existence of the problem. This survey consists of a questionnaire about audit procedures in general, followed by four case studies in which auditors are asked questions about their sample selection. I found the questionnaire on procedures in general to be of little interest. It is far more relevant to question auditors about what they would do in a case study where background information is given.

As with most Committee products the result of the study is a compromise, in this case between the statistical sampling enthusiasts and the sceptics. An early chapter takes as common ground the development of a 'testing process' equally relevant to statistical and non-statistical testers. Other chapters discuss the concepts of materiality and risk, which must be considered by non-statistical as well as statistical samplers. Later chapters relate materiality to precision and risk to confidence level and the relevance of these factors is demonstrated. A final chapter suggests no fewer than ten further research projects and this serves to emphasise that the guidance given in the study still leaves many questions unanswered.

However, the case for developing Institute requirements on the extent of testing is very strong. Without it, present operational auditing standards in Canada and the UK are something of an empty shell. My doubts about the guidance given in this Study are connected with a lack of clarity as to what 'guidance' is supposed to achieve. There is a place for 'high level' statements which, for example, require the auditor to consider the appropriateness of various sampling techniques and possibly also to justify his choice (or the decision not to use any formal technique). There is also a place for 'educational material' which explains the advantages, limitations and operations of each technique. In my view this study,

however, does not quite satisfy either of these needs. It does not explicitly consider the form or suitability of possible standards in the area of audit testing and I feel there are existing sources which provide rather better educational material.

In the second of the two Studies, the limited audit engagements considered include comfort letters, compliance reports, review assignments, reporting on interim financial statements, reporting on supplementary information presented with financial statements, reporting on internal control and profits forecasts. This list represents some of the areas where the auditor is under a lot of pressure to extend his services but is cautious about the possibility of reports based on less than an audit standard of evidence subsequently proving incorrect with the attendant possibility of discredit and costs for damages.

Each of these limited audit engagements is addressed, in essence, by the following questions:

1. To what extent should the provision of limited audit assurance be restricted to those users who understand the limited nature of the work performed and the responsibilities assumed?
2. What should be the minimum evidence required before limited assurance should be given?
3. To what extent should limited assurance be restricted to those subject matters susceptible to audit procedures and within the competence of the auditor?
4. Should explicit assurance in the form of negative assurance be provided and how should the scope of the audit work be communicated?

For each question, the author discusses the answers implicit in present Canadian and US Auditing Statements and is able to point to a number of significant anomalies. He then considers how he thinks the questions should be answered and develops a set of statements covering limited audit engagements which are both consistent with his views and with each other. Thus the study is well constructed and entirely logical.

In answer to the first of his questions, the author argues that there should either be evidence of acceptance by the user of the limited nature of the work undertaken or, if the report is general purpose, then it should be supported by generally recognised professional requirements for the type of engagement concerned.

The author's view of the second question is that as a minimum for any explicit statement of assurance, the auditor must have audit based knowledge, knowledge of the system and internal controls, and have performed a review to a specified standard. The necessity for audit based knowledge or its equivalent is likely to be regarded as conservative by those in the UK who wish to replace the statutory audit requirement for small companies with a review.

The author maintains that limited audit engagements should be restricted to matters which are auditable and within the auditor's competence and, provided his requirements for the first three questions are met, the author supports an explicit statement of assurance by means of 'negative assurance'.

This Research Study will prove extremely beneficial to those in the UK responsible for developing reporting standards for limited audit engagements.

Edinburgh

David Hatherly

Introduction to Financial Accounting. *Woelfel, C. J.* Goodyear Publishing Company, 1980. x + 662 pp. £12.30.

This is an introductory book which, in common with most American texts, is a highly professional package. In addition to the textbook, the students can obtain key solutions, a practice set, and various other items. For the lecturer, or instructor, there is a comprehensive solutions manual, transparencies and a testbank of achievement tests, comprehensive examinations and additional questions for each chapter.

The first four chapters start with a discussion of the environment of accounting, accounting as an information system, the balance sheet (or position statement) and then proceed to the income statement. Chapters 5-9 cover the accounting cycle and procedures. Chapter 8 is devoted to *impact analysis* and the *ripple effect* of events on the

major sets and subsets of data in the accounting system. Readers may be surprised to find that the chapter on data processing is largely devoted to control accounts. Others may be reassured to know that there is little sign that the Americans are ahead of us in incorporating computing concepts into introductory accounting.

Chapters 10-13 deal with accounting for current assets, chapters 14 and 15 with long-lived assets, and chapters 16 to 19 with ownership equities including companies, partnerships and groups. The final section has three chapters on additional topics including income tax, cash flow statements, a modicum of accounting for price-level changes and the human element in accounting.

Naturally enough, the text refers throughout to APB opinions and FASB statements and whilst British accounting standards may be largely derivative, the force of our statutory framework is still sufficiently strong to create problems in this for the student at the elementary level.

Although the book, as it claims, explains the 'how' and the 'why' of financial accounting theory and practice, its basic structure is firmly traditional if compared to the modernists May, Mueller and Williams. That is not necessarily a bad thing. In many respects, Charles Woelfel's book is a good one. It incorporates a sound and systematic approach to pedagogical problems which is rarely found in the British counterparts, which are, as it happens, increasing in number.

The adaptation required of the British student and lecturer if they use this book is not really very demanding but I suspect may still be too much. The courses on which this book might be considered would be BEC or Foundation courses or as a supplementary source on traditional accounting for students on courses which adopt a more conceptual approach.

Dundee College of
Technology

Douglas Garbutt



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Volume 11 No 44 Autumn 1981

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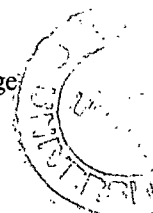
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Accounting Standards—Boon or Curse?*

William T. Baxter

Nearly thirty years ago, when 'accounting standards' were still novel, I was rash enough to write an article that expressed doubts about them. Unlike anything else that I have written, it must have been read by some eminent members of the profession: for it evoked bantering retorts, and no doubt helped to strengthen the distaste then felt for academic accounting. Now that time has given experience and perspective, perhaps a second article will not come amiss—particularly as the Accounting Standards Committee has itself started a discussion in its consultative paper on *Setting Accounting Standards*.

Standards were almost unknown before World War II. Now they dominate the accountant's work. They already fill volumes; and fresh ones keep pouring forth, with no sign of the stream drying up. They are to be found in many lands, and national standards are being topped up with international standards. Any accounting group that is not yet emitting them must feel sadly behind the times, and will no doubt soon be adding its contribution. They have for the most part been accepted willingly enough, and even with enthusiasm. The general expectation is that, in a world made safe by enough standards, accounting will no longer be plagued by scandals, and our noisy defamers will have to hunt elsewhere for a quarry.

Origins of standards

It is perhaps worth our while to look back at the origin of standards. They grew from small and inconspicuous beginnings; I doubt if anyone said at the start: 'what we accountants need is a set of official rules telling us how to handle every important aspect of our work'.

The first milestone of note was the *Statement of Accounting Principles*, published by the American Institute in 1938. Though the Institute commended this book to members in a foreword, it was the work of three authors (Hatfield, Sanders,

and Moore) who were not members but had been prompted by the Institute to carry out this task. Such an arrangement seemed excellent: the Institute encouraged research, but did not lend its authority to any of the findings.

Since then, the pronouncements have become more closely linked with the sponsoring bodies, and the latter have tended more and more to back the findings. Thus the American Institute in 1939 charged its committee on accounting procedure with the task of issuing research bulletins. The committee stated its aim as:

to consider specific topics, first of all in relation to the existing state of practice, and to recommend, whenever possible, one or more alternative procedures as being definitely superior to other procedures.

Bulletin no. 1 stressed the need for good accounts (particularly because of the growth of companies), and the consequent 'demand for a larger degree of uniformity in accounting'. It said that its rules would be subject to exception, but that 'the burden of proof is upon the accountant clearly to bring out the exceptional procedure and the circumstances which render it necessary'.

Just after World War II, the Institute of Chartered Accountants in England and Wales took a comparable step. It announced its venture in mild words that do not herald momentous change:

The Council has requested the Taxation and Financial Relations Committee to consider and make recommendations to it on certain aspects of the accounts of companies and it is proposed from time to time to publish approved recommendations for the information of members.

The announcement continues with a clear denial of intent to make the new rules mandatory:

It is, of course, a matter for each individual member to consider his responsibility in regard to accounts presented by directors, but it is

*Based on an Emanuel Saxe Distinguished Lecture at the Bernard M. Baruch College of The City University of New York.

hoped that the recommendations to be made will be helpful to members in advising directors as to what is regarded as the best practice.¹

Thus accounting bodies on both sides of the Atlantic drifted into the new system without clear ideas of where it would take them, and with few, if any, formal motions of consent by the members. A revolution took place with far less fuss than would be needed for a minor change in the bodies' constitutions.

Development of standards

There have been several stages in the evolution of the committees that issue standards.

American Developments

In America, the stages have been as follows:

- (1) Committee on Accounting Procedure.
Accounting research bulletins (ARBs) were issued by the committee on accounting procedure of the AICPA. The process started in 1939. By 1953, 42 ARBs had come out; in that year, they were consolidated into ARB 43. Only 8 more ARBs were issued during the remaining six years of the committee's life.²

The ARBs had a big impact. But the committee was subject to many pressures and distractions. Its members were part-time. Its staff were inadequate in numbers and kept changing. Its critics claimed that it did not rely enough on research, that it was the catspaw of the SEC, that it had no teeth, and that its bulletins were equivocal (e.g. the one on inventories authorised the use of three different methods).

- (2) Accounting Principles Board.
Because of this dissatisfaction, the committee was scrapped in 1959 and replaced by the Accounting Principles Board (APB). This had more money, and it engaged distinguished men to run a full-time research division. But otherwise it was much the same as its predecessor. It issued 31 'opinions' on a wide range of fundamental topics. Among other things, these tried to narrow areas of difference, and to settle such debatable issues as accounting for the oil

and gas industry, research and development, and—most controversial of all—investment credits.

The APB too failed to placate the critics. They said that it was cumbersome in size, that it was dominated by the profession to the detriment of business, that its 20-odd part-time members met too seldom and did nothing till the research division sent up material. Its opinions aroused violent debate (that on investment credits inspired over a thousand letters of protest). Perhaps the hostility was a sign that the opinions threatened to be effective: company managers preferred 'flexibility' to binding rules. In his survey of this period, Professor Moonitz sadly concludes that 'a professional body, acting by itself, is incapable of obtaining agreement on a set of accounting standards ... the layman simply will not let it do the job.'³

Dissatisfaction with the APB led to the setting up of yet another group:

- (3) The Financial Accounting Standards Board (1973).

This is composed of seven full-time members, from widely-separated backgrounds. It is generously financed, superbly housed, has a large and able staff, and is independent of the AICPA. It is punctilious about public hearings and first publishing its views as exposure drafts; its final statements are no longer 'bulletins' or 'opinions', but 'standards.' We must wait to see how much better this body functions than its predecessors; at least, its organisation avoids many of their defects.

British Developments

In Britain, the story has been rather different, in part because of the profession's split into six major bodies. As I said above, the English Institute started the issue of 'recommendations'; it continued the process till 1969. Then the other bodies decided to sail in the same boat; their joint committee (the Consultative Committee of Accounting Bodies) therefore set up the Accounting Standards Committee. This has, as I write, issued some sixteen standards.

A noteworthy feature of the story is that on one occasion—when the date approached for imple-

¹*The Accountant*, December 12, 1942, p. 354.

²For full details, see John L. Carey, *The Rise of the Accounting Profession*, New York: American Institute of CPAs, 1970.

³M. Moonitz, *Obtaining Agreement on Standards in the Accounting Profession*, AAA Studies in Accounting Research, No. 8, 1974, pp. 67, 79.

menting the standard on inflation accounting—dissenting members of the English Institute put up a motion designed in effect to reject the standard. Despite the admonitions of the leadership, the motion was carried at a substantial poll. We could long debate whether this revolt shows the members as deplorable stick-in-the-muds or as men too wise to swallow half-baked proposals.



Growth of Mandatory Powers

The disciplinary powers of accounting institutes vary from country to country, but usually are mild. Unaided, institutes could hardly force even their own members into complete compliance with a standard. Non-members, including powerful groups such as company directors, are not under the slightest obligation to accounting bodies, and might be expected to brush standards aside whenever it suits them. (And, to complicate matters, the non-members may fall into conflicting camps. Thus the owners of small companies may favour profit rules that minimise early tax. The managers of big companies may favour instead flexible rules that smooth profits from year to year. Ideally, such partisan interests should not influence our reasoning on abstract principle; in the real world, they are likely to carry much weight.)

But the degree of compliance has in fact been substantial. The institutes have high prestige, and can count on the loyalty of members. And the standards boards are reinforced in several ways. First, the auditor of a non-complying company should disclose departures from standards. This threat has been a considerable deterrent. (In Britain, however, there have now been so many qualified reports—with no serious harm to the delinquent companies—that this weapon is losing its edge.) Again, other kinds of (non-governmental) bodies may serve as allies to the accountants. Thus stock exchanges in both America and Britain have threatened to withhold quotations from offending companies. Such threats serve to deter at least companies that are big and want to expand further.

But the above constraints are small beer compared with sanctions imposed by government. These may take oblique forms (e.g. tax requirements) or be more direct. In America, the SEC has made the FASB's standards mandatory for companies under its surveillance. In Britain, the Argyll Foods case has shown that a court may view non-conformity as a crime.

So we have gone far since standards first appeared. They started as gentle guides; they now are becoming firm rules, backed by sanctions.

But they have not yet been tamely accepted everywhere. Perhaps it is correct to say that the most successful rebels are not stray mavericks but powerful companies grouped as an industry and seconded by big auditing firms, e.g. oil companies in the US and property companies in Britain; as I write, notable business leaders threaten to snap their fingers at the new inflation standard (SSAP 16). Strident protest can win dispensation or alter principle. Sometimes protest has become political action; disaffected oil companies in the US are said to have spent \$3 million in preventing the rule on dry holes from becoming tax law. A well enough financed lobby could probably amend the law of gravity.

The anatomy of standards

Let us next look at the structure of standards. Usually they consist of three parts:

- (a) A description of the problem to be tackled;
- (b) A reasoned discussion (possibly exploring fundamental theory) of ways of solving the problem. Then, in the light of decision on theory;
- (c) The prescribed solution.

So here we have an instance of authority telling us how both to think and act.

Rules of Action versus Truth

It is important for our argument to distinguish between the two forms of pronouncement by authority.

The first is a bald rule on how we are to act—a command to behave in this or that way. If such commands make life run more smoothly, they may well be good. Thus a law compelling drivers to keep to the left (or right) of the road helps us all; again, the rules of a sports association make games more enjoyable.

The essence of these good 'standards' is that they consist only of part (c) of the above list. They stress *what* we are to do, but say little about *how* and less about *why*. They steer clear of (b), principles. Sporting rules work well though they say nothing about the dynamics of tennis balls or the psychology of footballers. Note that auditing standards can confine themselves to (c), rules of action. This may help to explain why they arouse less criticism than accounting standards.

Admittedly, the men who draft rules of action must sometimes be swayed by theory. A legislature may have to choose between rival theories, e.g. public health law may assume that Pasteur was right. Yet this kind of rule does not set a seal of approval on a theory. It merely enables us to follow a hopeful line of action; if the rule does not work, it can be scrapped without loss of face. A legislature that explicitly endorses a theory—as when Tennessee backed fundamentalism—is straying beyond its proper function, and must antagonise all who value freedom of thought.

Sometimes *definitions* are tacked on to rules. They can be helpful if they make the given rules work better—but not if they are regarded as applicable elsewhere, still less if they are viewed as revelations of truth.

With accounting standards, the frontier between (b) and (c) must often be hazy. You may indeed feel that I am pedantic to stress it. But it lies near the heart of our problem. If a standard confines itself to (a) and (c), it may or may not be a useful rule of action; at least, it can be judged by how it works. When it includes (b), it incurs two extra risks: its reasoning may be false, and it will impede other attempts to reach truth.

Subject Matter of Standards

Such ideas are reinforced when one considers the subject matter of standards. These deal with different subjects, and vary in quality accordingly. Four types can be distinguished.⁴

Type 1 states that accountants must tell what they are doing, i.e. their published reports must explain what 'accounting policies' have been followed.

Type 2 aims at uniformity of layout and presentation. The US and Britain have so far tended to by-pass this type. Germany and France, on the other hand, favour standardisation of layout, with numbered classifications in balance sheet and income statement. The international standards of the future may well impose similar requirements.

Type 3 calls for disclosure of specific matters, notably where the reader ought to exercise his own judgement. Examples of such matters are research and development cost, depreciation, and

extraordinary items. *Type 3* can perhaps be stretched to cover also the demand for a flow of funds statement.

Type 4 tells us how we should measure economic phenomena—i.e. what are the approved concepts for asset valuation and income assessment. It deals for instance with depreciation methods, stock values, deferred tax, and foreign exchange.


Critique of the Four Types

It is hard to quarrel with the aim of *Type 1*—to make accountants explain the assumptions and policies of their published reports: 'It is an elementary but fundamental rule of statistical presentation—and indeed of simple good sense, manners and respect for your audience—to make it clear how your figures have been compiled'.⁵

Standards of *Type 2* are not quite so attractive. Uniform layout has its advantages: thanks to it, we do not need to waste time hunting for given items. But it carries the obvious risk that the layout will become a straitjacket—that it will not suit all kinds of firms, and will stop experiment. The style of published accounts has improved enormously in recent years, and there is no reason to think that the process cannot go further if left unfettered.

So far as *Type 3* merely calls for more disclosure, it is free from objection (unless indeed the flood of standards leads to an indigestible quantity of details and notes). But of course it will not prevent differences of judgment, on e.g. what constitutes 'extraordinary'.

It is *Type 4* that should arouse most doubt. For here a standards committee debates principles (or sometimes tries to think up new ones); it weighs the *pros* and *cons* of different theories, and decides for us that such a one is the best. In short, authority here informs us where the truth lies.

There are now demands that standard-makers should—to avoid error and inconsistency—produce a conceptual framework. The FASB has made some progress to this end. Such a super-standard of ultimate principles would be a fearsome extension of type 4. 

The good side of standards

If we are to judge fairly, we must spell out the benefits that standards confer.

They give us handy rules for our daily work; in this respect, they somewhat resemble the account-

⁴I here follow the classification of H. C. Edey, 'Accounting Standards in the British Isles', in Baxter and Davidson, *Studies in Accounting*, 3rd edition, London: Institute of Chartered Accountants of England and Wales, 1977, p. 294. This, and its companion article by A. M. C. Morison, argue the pros and cons of standards. Rather unexpectedly, the academic author is on balance favourable, whereas the partner in a large firm of chartered accountants is mercilessly hostile.

⁵Edey, *op. cit.*, p. 296.

ing manuals of big firms. Standards of types 1 to 3 have greatly reinforced the process of improvement in published reports. They provide shareholders with figures that are fuller, clearer, and more consistent. In this way, they act rather like additions to company law—supplementing it where it is weak. Often indeed standards have paved the way for new law (e.g. Britain's Companies Acts) and for new regulations with semi-legal force such as those of the SEC. Standards may thus play a useful role as a way of testing out new methods.

Because they foster comparability between firms, standards help analysts and potential investors; there is even something to be said for the view that it is better if all firms issue second-rate figures on the same basis than first-rate figures on conflicting bases. Standards are useful also to government, for tasks such as price control. If Congress is to understand the US oil industry, the producers' figures for cost and profit must be presented on the same basis.

The advocate of standards can easily add to this list of good points (and no doubt could phrase the additions more delicately than I). Thus standards force our weaker brethren to improve their work. An accountant feels sheltered against allegations of misconduct if he acts in step with all other accountants. And, if a tycoon tries to bully his accountants into producing tilted figures, standards may strengthen resistance.

But by far the most interesting claim for standards (type 4) is that they lead us to—at any rate nearer to—the 'right' measures of value. Here the assumption (tacit or otherwise) must be that standard-makers can, thanks to prolonged debate and intellectual gifts, perceive economic truth more clearly than other folk. This idea will be discussed later on.

The grounds for doubt

Let us next look at the counter-arguments, starting with the more practical problems:

(1) The making of standards is becoming costly and bureaucratic. Effective policing will demand still more resources, and will excite much resentment. Standards may also burden companies with high start-up and running costs.

(2) Standard procedures may become petrified procedures. What starts as progress may later become a check on progress.

(3) Accounting figures are not docile, and do not lend themselves to standardisation. Industries differ from one another. So do firms within an industry (or, very likely, straddling several industries). The same firm may change from year to year. And the needs of users vary. So, if standards are aimed to suit the 'average', they may be quite unsuitable for the fringes. The marginal firms will then turn restive.

(4) The wording of standards will inevitably bring difficulties of interpretation:

If they are broad enough to cover the variety of circumstance, they become platitudinous and admit the very disparity of treatments they were designed to avoid; if they are narrow enough to exclude this, then all sorts of hard cases will come up with a silly result.⁶

Thus the successful accountant and auditor may be he who is best at hair-splitting and casuistry, not he who best pictures the economic facts. And men soaked in rules soon begin to mistake rules for reality. To quote from Bacon: 'The first distemper of learning is when men confuse words with matter.'

(5) Standard-makers may have to bow to political pressures.⁷ Already one hears the argument that standards ought to further desirable political and social ends. Most of us would answer that figures can best further desirable ends by being unbiased and accurate. The danger of 'politicisation' is real enough. An obvious and regrettable instance is ASC's switch of inflation standard, under government pressure, from constant purchasing power to current cost accounting. Note too that a group bound by a rigid code can be manipulated by government far more readily than one where individuals act in freedom.

(6) The essence of a profession surely is that each member is willing to think and judge for himself about matters of principle. If members abdicate from such responsibility in favour of a ready-made code, they cease to command respect: in time, moreover, they will become less able to think and judge.

(7) Even if a standard lays down a principle well, it may leave scope for personal estimate:

⁶Morison, *op. cit.*, p. 279.

⁷Professor David Solomons argues this point with his usual skill in 'The Politicization of Accounting', *Journal of Accountancy*, November 1978, p. 85.

we must still choose the figures to be slotted into the formulae. And many of the figures must be a subjective compromise, with plenty of room for disagreement. In most fields of physical measurement, disagreement over size will rightly suggest that the measurers (or their instruments) are at fault. In contrast, we expect some disagreement between judges of (say) ice-skating, or diving, or beauty; such disagreement is far from suggesting incompetence. The estimation of wealth is probably closer to judging in a beauty competition than to physical measurement. Sooner or later, our profession will have to recognise that standards cannot guarantee identical estimates by different accountants, and that we must educate the public on the point. Until we do so, we shall continue to be fair game for our critics.

If you are disposed to agree about any of these dangers, then you must agree too that optimism would be misplaced. Standards will bring many setbacks and much disillusion.

The Nature of Principles

The theorist can, however, see a further, and more weighty, reason for mistrusting type 4 standards. His objection springs from respect for scientific method. A good scientist accepts that 'principles' must be regarded as tentative. His knowledge of history strengthens this view: sooner or later, principles are likely to be improved on, if not refuted. Only god-like creatures know where the truth lies. It follows that *ex cathedra* pronouncements by human authority are pretentious, and inevitably must sometimes be wrong. The most eminent authorities erred persistently on, for instance, the shape of the earth, the origins of life, and the circulation of the blood; more recently, the council of the English Institute and the ASC have gone badly off the rails with their pronouncements, from 1949 onwards, on inflation accounting. We cannot with complete confidence expect infallibility in the future. Another saying by Bacon still applies: 'Truth is the daughter, not of Authority, but of Time.'

A corollary is that knowledge flourishes best where there is complete freedom of thought. And this means the absence, not only of crude tyranny, but also of any benevolent authority that makes us respect some ideas and discount others. Ideas should compete on equal terms. The engineer Brunel wrote (to a commission considering compulsory standards for bridges):

No man, however bold or however high he may stand in his profession, can resist the benumbing effect of rules laid down by authority. Occupied as leading men are, they could not afford the time, or trouble, or responsibility of constantly fighting against them—they would be compelled to abandon all ideas of improving upon them; while incompetent men might commit the greatest blunder provided they followed the rules... Devoted as I am to my profession, I see with fear and regret that this tendency to legislate and to rule, which is the fashion of the day, is flowing in our direction.⁸

The structure of the authority must also be considered. A committee is less fitted than a single person to think boldly and coherently. 'A camel is a horse designed by a committee.' Though committees can be useful for collecting facts, or reaching consensus on what kind of ideas will prove acceptable, they are not likely to produce brilliant new ideas. Their members may think best in solitude; and, sitting together, may be hampered by the need for tact and compromise, or by pressures from outside.

Experience of Other Professions

If standards confer patent benefits, it is perhaps worth our while to ask why other professions have little use for them.

True, other professions are subject to 'standards' in the sense of legal or moral constraints. But they seem unattracted to compulsory type 4 standards. One reason is that standard rules would soon be obsolete rules in a dynamic profession; even the non-controversial best of the present will be the future's second or third-best. Brunel put it more strongly:

rules will 'embarrass and shackle the progress of improvement tomorrow by recording and registering as law the prejudices and errors of today. Nothing has conduced more to the great advancement of the profession and to our pre-eminence in the real practical application of the science, than the absence of all *règles de l'art*.'⁹

A pure scientist would have even less use for type 4 standards. He presumably accepts that his job is

⁸ *The Life of Isambard Kingdom Brunel, Civil Engineer*, London, Longmans Green, 1870, p. 488.

⁹ *Op. cit.*, p. 488.

to attack and test hypotheses—that he functions best as a Doubting Thomas, not a believer. We cannot imagine a society of physicists or astronomers setting up a committee to issue solutions to problems of the unknown: any such attempt would be laughed out of court.

History

Accounting standards have much in common with the rules of guilds in medieval and Stuart times. Those rules, like ours, were made partly because of scandals, and were meant 'to guarantee the consumer a supply of sound and serviceable commodities at reasonable rates'.¹⁰ Enforcement was 'committed to men of gravity' so that 'the particular grievances and deceits of every trade might be examined, reformed, and ordered'; these men had even the right of search. The state backed the guilds with legislation. By 1792, there were 311 laws on the wool trade alone. 'The minutest rules were framed respecting the nature of the materials, the use of mechanical devices, and the form of the finished product.'¹¹

The long-run results of these controls were disappointing. Authority did not 'succeed in destroying the evil which it lamented'. The multitude of rules tended to confuse business and thus defeat their own purpose. Enforcement proved hard; and, where it was effective, it hindered progress and mobility. In the end, the rules degenerated into 'the obsolete restraints of a static society', and by the time of the Reform Act were abolished or forgotten.¹² Thus history does not afford us much comfort.

Collective Controls in the Political Sphere

At this point, we should perhaps dwell for a moment on a rather odd thing. It is a safe bet that some 90% of accountants are not excessively fond of government. Their political philosophy holds that the state should interfere little in the affairs of good citizens, and that state controls soon reach a point at which they do more harm than good. Such men would scoff at the notion that, by entrusting difficult problems to political authority, we bring the millenium closer.

Yet these very men have now erected, and are submitting to, an extra form of authority within their own profession. Some of them hungrily demand still more controls over their daily work,

and do not doubt that the outcome will be good. Is this not a puzzling paradox?

My critics can reply that the rules of the state are very different from those of a profession; indeed, this view has led some liberal US accountants to condemn SEC regulations yet welcome FASB standards. I think the difference is one of degree only. The essence of the matter is that external authority compels the individual to respect a given code of thought: the nature of the authority is unimportant.

Conclusions

So where has our discussion got us? Standards have probably led to many improvements. So long as they are bland and avoid sensitive areas, they are popular. If however they threaten to plunge the accountant into ill-understood complexities, or to slash the profit figures of business, they are attacked and sometimes defeated. And a theorist must suspect that, by the tests of both logic and history, type 4 standards are inherently defective; other men are more likely to view the defects not as fundamental but as remediable faults of draughting or detail.

The process of issuing standards has now acquired such momentum, and aroused such high expectations, that we must accept it as irreversible—at least for the time being. Presumably it will someday reach a point of equilibrium—where those who call for still more standards are checked by those who are sated. That point is not yet in sight. ✓

But if we must willy-nilly live with standards, we should at least be wide awake to their nature and limitations. And we should be careful to adopt as many safeguards as possible.

The possible dangers in accounting standards could be lessened in various ways:

(1) As page 5 pointed out, standards normally lead up to their conclusion with a section that explores various principles, and then backs one of them. The briefer this section, the better: authoritative pronouncements on principle are unwise. There would be a strong case for limiting a standard to a bare statement such as that the recommended procedure is already the most usual one.

(2) The same reasoning tells us to be wary of the type 4 standards of page 6. They are more prone than types 1, 2, and 3 to stray on to thin ice.

¹⁰G. Unwin, *The Guilds and Companies of London*, London, 1924, p. 103.

¹¹E. Lipson, *The Economic History of England*, London: Adam & Charles Black, 1956, III, pp. 319–335.

¹²*Ibid.*, pp. 344–351.

(3) Pronouncements on theory are less likely to overawe us if they are described as the work of named persons. We all know that individuals can err; we tend to credit institutions with more wisdom. Therefore it would be helpful if standards were signed. Moreover a dissenting opinion adds a valuable dimension. So does an admission that an earlier standard was wrong.

(4) A standard should not pander to political ends.

(5) Standards should be explained in terms of *normal behaviour* (as was stressed in Britain at their introduction). A standard is a rule to be followed so long as it fits the facts. The accountant should be free—and is indeed obliged by the 'true and fair view'—to depart from it when he judges that it will distort the picture. Deviation from standards should of course be described and justified, where possible with a numerical estimate of its effect.

Standards and intellectual training

My paper has (I fear) done more to list doubts than to solve problems. But on one point I am clear. Let us agree for argument's sake that standards—particularly if issued with safeguards—may for a time do more good than harm in the world of practice. I still find it hard to feel anything but gloom about their effect on education.

The study of standards now plays a big part in any accounting curriculum. They must have a

profound influence on students, just when these are at their most impressionable and uncritical. You have only to look at an up-to-date textbook to see how much weight is given to official pronouncements, how little to the economic reality that accounts are supposed to show. Standards are a godsend to the feebler type of writer and teacher who finds it easier to recite a creed than to analyse facts and to engage in argument. If an official answer is available to a problem, why should a teacher confuse examination candidates with rival views? Thus learning by rote replaces reason; the good student of today is he who can parrot most rules. On this spare diet, accounting students are not likely to develop the habits of reasoning and scepticism that education should instil.

And the student will have little cause to abandon his passive attitude when he leaves the university and enters practice. Here too he must be the respectful servant of standards. We may indeed envisage a brave new world in which an accountant spends his whole life applying rules propounded by others—unless at last, full of years and honours, he himself ascends to the standard setting authority and then for the first time must face reality.

I am sorry to end so glumly. But the trend in accounting education must make one pessimistic. For many years, academic critics viewed accounting—wrongly, to my mind—as unworthy of a place in higher studies. It got in at last. Now that we are substituting rule-of-thumb for reason, one must sadly admit that our critics were right.

Assessment of Prior Distributions: The Effect on Required Sample Size in Bayesian Audit Sampling

Edward Blocher

Introduction

Auditors are becoming increasingly aware of the potential benefits of Bayesian probability revision methods for audit sampling procedures. The Bayesian methods provide a logical basis for combining the different forms of audit evidence—sample and non-sample information—in making audit judgments. However, there are difficulties in implementing the Bayesian approach. Some have suggested that a major source of the implementation problems is the auditors' difficulty in assessing the prior probability distribution reliably [Corless, 1972; Felix 1976]. Thus a question of interest for audit research and practice is the extent of the effect on audit sampling decisions of possible error or bias in the assessment of the prior probability distribution [Hatherly, 1975]. How, for example, will the audit sampling choice differ if two equally informed auditors disagree about the mean or the variance of the prior probability distribution?

In this study, questions like this are addressed through a sensitivity analysis of the effect on required sample size of changes in the prior subjective probability distributions assessed by auditors in a field setting. Through this analysis, the effect of differences in the prior distribution can be investigated systematically. The principal objective of this analysis, then, is to examine the behaviour of the required sample size in Bayesian sampling in order to provide a better understanding of some of the implications of the Bayesian methods in an audit context. Additionally, a second objective is to analyse the findings for implications regarding the choice between classical and Bayesian audit sampling methods.

Bayesian Attribute Sampling and Required Sample Size

This section explains the audit sampling procedure chosen for the analysis in this study—the

required sample size in Bayesian attribute sampling. Bayesian methods have been applied in auditing primarily to attributes (error rates) sampling procedures. The attributes procedures are appropriate for testing compliance with established internal control procedures, as a basis for choosing the extent of subsequent tests of account balances.¹

The audit decision in the application of attributes tests is typically an assessment of the acceptability of an audit population regarding compliance with a given control procedure. In effect, the audit decision is either to accept or to reject an audit population based upon the error rate observed in the sample. An important step in performing this test is to choose the required sample size. In classical sampling methods, this choice is based upon the auditor's desired reliability for the test, the projected error rate in the population, and the maximum acceptable error rate.²

Bayesian methods can potentially reduce the required sample size, since they allow the auditor to use the prior information obtained from an internal control review, observation of the client's procedures and personnel, and the findings of prior year audits. By combining the prior information with sample information, the auditor is potentially able to reduce the mean and the variance of the probability distribution for the error rate after sampling (relative to the classical approach), and thus reduce the required sample size. As a result, it seems appropriate to use the

¹Statement on Auditing Standards No. 1, Section 320.

²See, for example, Arkin [1974, pp. 141–157] for a discussion of classical acceptance sampling methods.

Table 1. Error Rate Estimates Used as a Basis for the Sensitivity Analysis

Part 1: Mean of Error Rate Estimates					
<i>Audit Population</i>	<i>Mean of the Error Rate Distribution Assessed by:</i>				
	<i>Supervisor</i>	<i>Manager</i>	<i>Partner</i>	<i>Average</i>	<i>Average Deviation</i>
Accounts Receivable	0.028	0.042	0.026	0.032	20.8%
Inventory	0.033	0.061	0.032	0.042	30.2%
Plant and Equipment	0.028	0.035	0.024	0.029	13.8%
Accounts Payable	0.033	0.035	0.024	0.031	14.0%
Revenue and Expense	0.033	0.051	0.024	0.036	27.8%
Average for all Populations	0.031	0.045	0.028	0.034	21.3%
Part 2: Variance of Error Rate Estimates					
<i>Audit Population</i>	<i>Variance ($\times 10^3$) of the Error Rate Distribution Assessed by:</i>				
	<i>Supervisor</i>	<i>Manager</i>	<i>Partner</i>	<i>Average</i>	<i>Average Deviation</i>
Accounts Receivable	0.527	0.478	0.514	0.506	3.8%
Inventory	0.419	0.465	0.413	0.432	5.1%
Plant and Equipment	0.527	0.544	0.652	0.574	9.1%
Accounts Payable	0.419	0.544	0.652	0.538	14.9%
Revenue and Expense	0.419	0.493	0.652	0.521	16.7%
Average for all Populations	0.462	0.505	0.577	0.515	9.9%

effect on required sample size as a measure of the sensitivity of the auditor's decision problem to differences in the assessment of the prior probability distribution.³

Factors which affect sample size in Bayesian sampling

Factors affecting the required sample size in Bayesian sampling include the auditor's subjective prior probability distribution, the chosen maximum acceptable error rate (L), and the desired test reliability (R). Recall that the auditor's decision problem in Bayesian acceptance sampling for attributes is to accept or reject an audit population, based upon a pre-determined maximum acceptable error rate, a desired level of test reliability, and a given subjective prior probability distribution, which has mean $E(p)$ and variance $\sigma^2(p)$, where p represents the unknown error rate. In choosing a sample size (s) the auditor must select desired levels for R and L , and estimate or predict the values of $E(p)$ and $\sigma^2(p)$ for the audit population.

The direction of the relationships among these four factors and the required sample size can be summarised as follows. The relationships among R , L , and s are based on well-known methods for determining sample size.⁴ There is a direct re-

lationship between R and s —the required sample size must increase if the auditor wants greater test reliability. Conversely, by increasing the acceptance limit (L) the auditor reduces the required sample size. The relationships among $E(p)$, $\sigma^2(p)$, and s can also be described if we assume that $E(p)$ is somewhat less than L (this assumption is relaxed later in the paper). Both $E(p)$ and $\sigma^2(p)$ are directly related to s , that is, if $E(p)$ or $\sigma^2(p)$ should increase, then it is necessary also to increase the required sample size. These relationships are apparent in the findings of the sensitivity analysis which follows.

Design of the sensitivity analysis

This portion of the paper describes the manner in which the prior probability distributions were obtained. Then there is a discussion of the basis used for determining the starting point and range of values for each factor [R , L , $E(p)$, $\sigma^2(p)$] in the sensitivity analysis.

Obtaining the Prior Probability Distributions

It is advantageous for the sensitivity analysis to be based on prior distributions which reflect the assessments made by auditors in an actual audit environment. This is important because the major issues addressed by the analysis relate to some of the perceived implementation problems associated with the Bayesian sampling methods. For this reason, the prior distributions used in this study were obtained from auditors engaged in an actual audit assignment. This approach has an additional advantage in that it provides a reason-

³The required sample size is also the variable of interest in Neter's [1956] study. Neter showed the effect on required sample size of changes in desired confidence and precision in a classical variables sampling context.

⁴These relationships are described in Arkin [1974], pages 82-92 and 293-359.

able basis for determining the range of variation for $E(p)$ and $\sigma^2(p)$ in the sensitivity analysis. The range of variation in the analysis can be chosen to reflect the range of the different probability assessments provided by the auditors.

The three participating auditors—the audit partner, manager, and supervisor from a large office of an international CPA firm—were each assigned to the audit for a medium size manufacturing firm. The audit was a return engagement, and the auditors explained that no unusual problems were expected in that year's audit. The auditors were told of the nature and objective of the study, and were asked to assess prior subjective probability distributions for monetary error for each of the five audit populations—accounts receivable, inventory, plant and equipment, accounts payable, and revenue and expense.

These five populations had been tested by sampling methods in previous years' audits. Each of the three auditors was familiar with statistical methods, and felt comfortable with the task of estimating the probability distributions. Estimates of $E(p)$ and $\sigma^2(p)$ were obtained for each population. The estimates of $E(p)$ and $\sigma^2(p)$ are presented in Table 1. These estimates are comparable to those obtained by Corless [1972] for estimates of error in payroll preparation, and to those of Felix [1976] for pricing and extension errors.

The continuous prior beta probability distribution was constructed from the auditors' estimates in order to facilitate Bayesian revision. The beta distribution is commonly used in audit sampling applications of the type examined in this study [Corless, 1972; Francisco, 1972; Felix and Grimlund, 1977]. Also the beta distribution is generally considered to be an appropriate distribution for modelling error rates in an audit context, partly because of its right-skewed shape.

Computing the Sensitivity Results

In considering the estimates of $E(p)$ and $\sigma^2(p)$ for these auditors, together with the findings of Corless [1972] and Felix [1976], it appears that deviations of about 50% from the sample average are representative of the larger deviation for these parameters. Thus, the range $\pm 50\%$ is used for these parameters in the sensitivity analysis to follow.

The range of variation for the maximum acceptable error rate was set at 6%, 8% and 10% and later reduced to 6% and 8% only, since it was found that no sample items were required for most of the cases where $L = 10\%$. The auditors participating in the study indicated that the range

6% to 8% was reasonable in the context. Finally, the level of desired reliability (R) was allowed to vary among 75%, 90% and 95%—the levels which are common in audit sampling applications. By choosing the range for R , L , $E(p)$ and $\sigma^2(p)$ in this way, it is intended that the range of variation of parameter values for the sensitivity analysis should be consistent with the range of values an auditor would expect in the attribute sampling context.

The required sample size for each combination of factors (R , L , $E(p)$, $\sigma^2(p)$) was calculated using a computer program which utilises the following property of the beta probability distribution in a Bayesian context.⁵ Given a prior beta distribution, $f_\beta(p; a, b)$, and a binomial sample result— r errors in s sample items—the posterior distribution is also beta, with the revised parameters, $f_\beta(p; a + r, b + s)$.⁶

This can be outlined as follows. The beta probability distribution is given by:

$$f_\beta(p; a, b) = \frac{(b-1)!}{(a-1)!(b-a-1)!} p^{a-1}(1-p)^{b-a-1}$$

where p is the projected error rate in the population, and (a, b) are the parameters of the beta distribution which define the mean and variance of the distribution. The prior and posterior means and variances are as follows, given a sample result of r errors in s items sampled:

	Prior distribution	Posterior distribution
Mean, $E(p)$:	$\frac{a}{b}$	$\frac{a+r}{b+s}$
Variance, $\sigma^2(p)$:	$\frac{a(b-a)}{b^2(b+1)}$	$\frac{(a+r)(b+s-a-r)}{(b+s)^2(b+s+1)}$

In order to determine the required sample size, the first step is to estimate the parameters (a, b) from the mean and variance of the subjective probability distributions assessed by the auditors. This is done using the formulae (Hastings and Peacock, 1975, p. 32):

$$a = E(p)\{[E(p)(1-E(p))/\sigma^2(p)] - 1\}$$

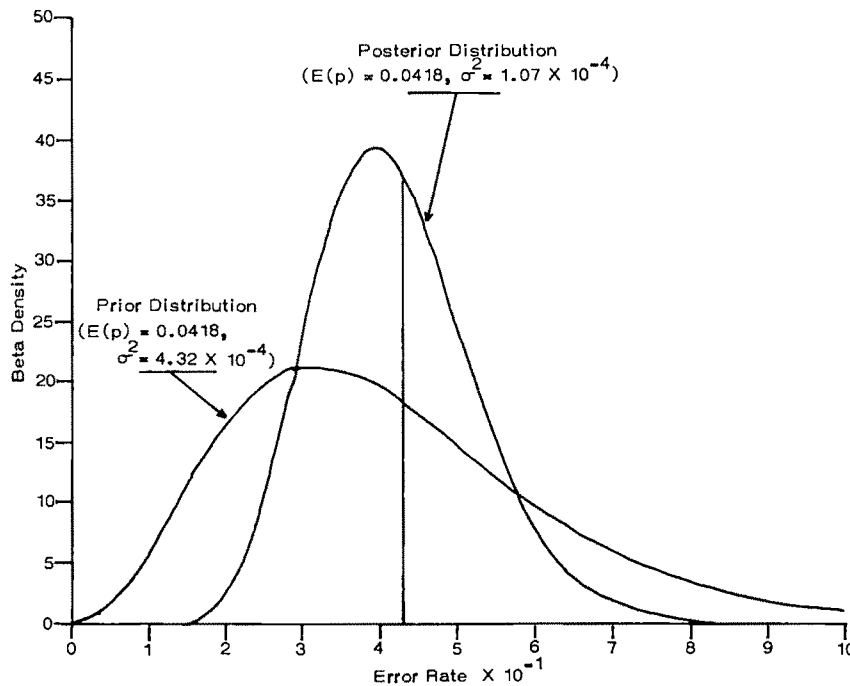
$$b - a = (1 - E(p))\{[E(p)(1 - E(p))/\sigma^2(p)] - 1\}$$

Second, given b and a , it is possible to compute the required sample size such that $f_\beta(p; a + r,$

⁵A source listing and explanation for this program is available from the author.

⁶See Schlaifer [1959, pp. 673-676] and Raiffa and Schlaifer [1961, pp. 265-270 and pp. 216-220].

Figure 1
Prior and Posterior Distributions: The Error Rate in the Sample Equals the Mean of the Prior Probability Distribution



$b + s$) satisfies the pre-determined L and R .⁷ To do this, some assumption about r , the number of errors expected in the sample, is required. Two possible assumptions are examined.⁸

First, one can assume that the error rate in the sample is equal to the mean of the prior probability distribution. This would be consistent with beliefs prior to the sample. With this assumption, an increase in sample size does not change the mean of the posterior probability distribution, but will reduce the posterior variance. In this way the posterior reliability (R) is increased as the sample size is increased given the desired acceptance limit (L). In Figure 1 the prior and posterior probability distributions are presented for the case in which the required sample size is computed with the assumption that the error rate in the sample equals the mean of the prior distribution. The

effect of the sample result on $E(p)$ and $\sigma^2(p)$ is apparent.

Second, one can assume that there will be no errors in the sample. This would be consistent with an approach designed to find the *minimum* required sample size. With this assumption, an increase in the sample size reduces both the mean and the variance of the posterior distribution, thus producing the desired reliability (R) with a smaller sample size than is possible for the original assumption. Both of these assumptions are included in the analysis since each reflects an audit strategy which can be appropriate in certain situations.

The sensitivity analysis is completed for each of the five population error rate distributions estimated by the auditors. This provides a means for relating the findings of the sensitivity analysis to questions of audit strategy regarding the allocation of sampling effort among the audit populations (as measured by the number of sample items).

⁷This is done by finding the sample size such that

$$\int_0^L f_p(a + r, b + s) = R.$$

⁸Raiffa and Schlaifer [1961, pp. 66-68] point out that the sensitivity of the relationship between prior and posterior distributions can be strongly influenced by the choice of different assumptions about the sample result. Raiffa and Schlaifer also discuss the implications of these two assumptions.

Findings of the Sensitivity Analysis

The major results of the sensitivity analysis are presented in Table 2 and Table 3. The data in

Table 2
Sample Size for Various Assumptions about Desired Reliability, Maximum Acceptable Error Rate, and the Prior Probability Distribution—Assume Sample Error Rate = $E(p)^*$

Audit Population	Maximum Acceptable Error Rate	Reliability	Parameters of the Prior Probability Distribution											
			$0.5E(p)$ $\sigma^2(p)$	$0.5\sigma^2(p)$	$0.8E(p)$ $\sigma^2(p)$	$1.5\sigma^2(p)$	$0.5\sigma^2(p)$	$E(p)$ $\sigma^2(p)$	$1.5\sigma^2(p)$	$1.2E(p)$ $\sigma^2(p)$	$1.5\sigma^2(p)$	$0.5\sigma^2(p)$	$1.5E(p)$ $\sigma^2(p)$	$1.5\sigma^2(p)$
Accounts Receivable $E(p) = 0.0319$ $\sigma^2(p) = 0.000506$	0.06	0.95			28	46	14	75	95	107	203	733	823	853
		0.90				3		9	31		92	353	444	474
		0.75											15	44
		0.95				3			10	3	28		56	86
Inventory $E(p) = 0.0418$ $\sigma^2(p) = 0.000432$	0.06	0.95		6	82	107	193	285	316	1,120	1,268		**	
		0.90			9	33	29	122	153	632	770			
		0.75								72	110			
		0.95				6		3	34	64	101	313	449	494
Plant & Equipment $E(p) = 0.0289$ $\sigma^2(p) = 0.000574$	0.08	0.95			26	38	7	55	72	58	136	318	387	412
		0.90						3	19		56	119	191	216
		0.75								2	23		34	58
		0.90							9					9
Accounts Payable $E(p) = 0.0307$ $\sigma^2(p) = 0.000538$	0.06	0.95			28	43	12	67	85	86	173	516	597	624
		0.90				2		7	38		76	230	312	339
		0.75											46	51
		0.90				2			11	3	26			15
Revenue & Expense $E(p) = 0.0362$ $\sigma^2(p) = 0.000521$	0.08	0.95			51	69	69	137	160	307	413	3,980	4,077	4,199
		0.90				17		45	67	108	215	2,295	2,392	2,425
		0.75										458	558	591
		0.95							21	27	53	48	147	180
		0.90									4		40	73
		0.75												

*Blank entries are zero.

**The required sample size cannot be computed for entries in this cell since $1.5E(p) = 0.0627$, which is greater than the acceptance limit, $L = 0.06$.

Table 3
Sample Size for Various Assumptions about Desired Reliability, Maximum Acceptable Error Rate, and the Prior Probability Distribution—Assume Sample Error Rate = 0*

Table 3 Sample Size for Various Assumptions about Desired Reliability, Maximum Acceptable Error Rate, and the Prior Probability Distribution—Assume Sample Error Rate = 0*																
Audit Population Accounts Receivable $E(p) = 0.0319$ $\sigma^2(p) = 0.000506$	Maximum Acceptable Error Rate 0.06 0.08	Reliability 0.95 0.90 0.75 0.95 0.90 0.75	Parameters of the Prior Probability Distribution													
			$0.5E(p)$ $\sigma^2(p)$	$1.5\sigma^2(p)$	$0.5\sigma^2(p)$ $\sigma^2(p)$	$1.5\sigma^2(p)$ $\sigma^2(p)$	$0.15\sigma^2(p)$ $\sigma^2(p)$	$1.2E(p)$ $\sigma^2(p)$	$1.5\sigma^2(p)$ $\sigma^2(p)$	$0.5\sigma^2(p)$ $\sigma^2(p)$	$1.5E(p)$ $\sigma^2(p)$					
Inventory $E(p) = 0.0418$ $\sigma^2(p) = 0.000432$	0.06	0.95	2	7	2	17	19	11	4	18	18	16	3			
		0.90			4	2	6	1	16	33	26	101	45			
		0.75						4	4	12	54	27				
	0.08	0.95				2		1	12	17	29	35	33			
		0.90									7	18	19			
		0.75														
Plant & Equipment $E(p) = 0.0289$ $\sigma^2(p) = 0.000574$	0.06	0.95				7	10	2	13	15	12	21	21	35	35	32
		0.90							1	4	3	7	9	15	19	18
		0.75														
	0.08	0.95					1					1	6	8	12	2
		0.90														
		0.75														
Accounts Payable $E(p) = 0.0307$ $\sigma^2(p) = 0.000538$	0.06	0.95				8	11	3	15	17	16	24	24	43	40	37
		0.90					1		2	5	9	11	22	24	22	
		0.75														
	0.08	0.95					1			3	1	7	10	14	3	
		0.90														
		0.75														
Revenue & Expense $E(p) = 0.0362$ $\sigma^2(p) = 0.000521$	0.06	0.95	3	4		12	15	2	22	23	34	35	33	77	60	51
		0.90					4		8	10	13	19	19	52	41	35
		0.75												14	13	11
	0.08	0.95								6	11	6	11	8	20	22
		0.90													6	10
		0.75														

* Blank entries are zero

*Blank entries are zero

Table 2 are based upon an assumed sample error rate equal to the mean of the prior probability distribution, while the data for Table 3 assume a sample error rate of zero. As expected, the required sample sizes in Table 3 are much smaller than the corresponding sample sizes in Table 2, and the differences are substantial in some cases. Changes in L , R , $E(p)$ and $\sigma^2(p)$ generally have much less impact on sample size when the assumed sample error rate is zero.

Notice that many of the entries in Table 2 and Table 3 are blank, which indicates that no sampling is necessary for these combinations of L , $E(p)$, and $\sigma^2(p)$, in order to achieve the desired reliability (R). This result is in accordance with the assessed priors, and yet it must be interpreted carefully, since the auditor may not want to omit sampling entirely in certain situations, irrespective of the achieved desired reliability. For example, some additional audit sampling objectives—'correction' and 'prevention'—are discussed by Ijiri and Kaplan (1971).

Now consider the individual effect of each of the four factors. Both Table 2 and Table 3 indicate that a change in the value of any of the factors L , R , $E(p)$ and $\sigma^2(p)$ can substantially affect the required sample size. However, in a relative sense the differences in the values for R and L have the greatest effect, while $\sigma^2(p)$ has the least effect. The impact for changes in $E(p)$ appears to lie somewhere between these extremes.

Additionally, there is evidence of interaction among the factors in the impact on sample size. For the factors, $E(p)$, R , and L , the amount of the effect on the sample size is greater for each of these factors when one or both of the remaining factors is changed in the direction which increases sample size. For example, if R is changed from 0.90 to 0.95, then an increase in $E(p)$ has a greater effect on sample size.

However, for the factor, $\sigma^2(p)$, the converse is true. The effect on the sample size for any of $E(p)$, R , and L is smaller when $\sigma^2(p)$ is changed in the direction which increases sample size. For example, as $\sigma^2(p)$ varies from $0.5\sigma^2(p)$ to $1.5\sigma^2(p)$, a change in L from 0.08 to 0.06 has a smaller effect on sample size.

Some caution is necessary in interpreting these findings. First, the findings are based upon a limited set of combinations of the factors R , L , $E(p)$, and $\sigma^2(p)$. Thus, they are subject to the reasonableness of the levels and ranges of the factors used in the analysis. Additionally, this analysis does not include directly the firm-specific and client-specific factors, such as risk and sam-

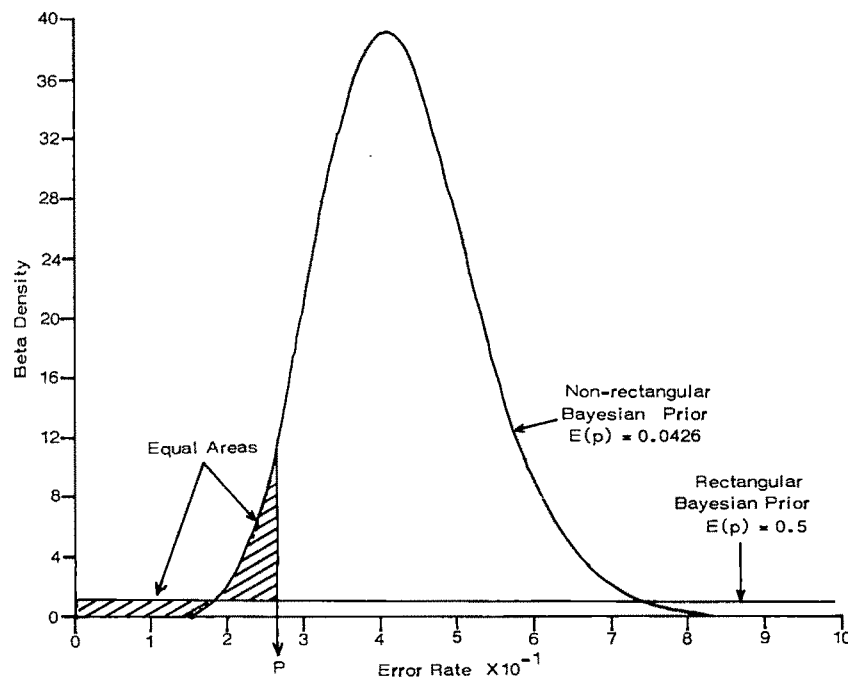
pling cost, which have an impact on the required sample size.

Comparing classical and Bayesian methods

The second objective of this study is to examine the findings of the analysis for implications regarding the choice between classical and Bayesian sampling methods in auditing. A careful analysis of the findings in Table 3 can provide a basis for comparing the classical and Bayesian approaches with respect to required sample size. Note that for most $E(p)$, R , L combinations in Table 3, an increase in $\sigma^2(p)$ causes an increase in required sample size. This is expected, since the increased prior confidence (lower $\sigma^2(p)$) should allow the auditor to obtain the desired posterior confidence with less sampling effort. However, in some cases an increase in $\sigma^2(p)$ leads to a decrease in sample size. This happens, for example, for most R , L combinations when the mean is set equal to $1.5 E(p)$. A common element of these cases is that $E(p)$ is close to L (roughly, when $E(p)$ is greater than $2/3$ of L). This suggests an intuitive explanation for this finding, as follows. As $E(p)$ increases to L , it is advantageous (in consideration of a desired reduction in sample size) for the auditor to have less confidence about the prior distribution, since this offsets the relatively high $E(p)$. That is, when $E(p)$ is low relative to L and thus favourable for sample size, lower variance (greater confidence) leads to smaller sample sizes; but when $E(p)$ is high relative to L and thus unfavourable for sample size, lower variance (greater confidence) leads to higher sample size. The remainder of this section is devoted to demonstrating this finding in a more rigorous manner.

To examine further the relationship between L , $E(p)$, $\sigma^2(p)$ and sample size, consider an extreme case of the 'low confidence' prior distribution. For example, a maximal degree of prior uncertainty can be represented by a rectangular prior distribution, over the interval zero to one, such that prior to sampling, each possible error rate is considered equally likely. This is, in effect, equivalent to classical sampling procedures which ignore the prior information. The rectangular distribution can be modelled by the beta distribution with $E(p) = 0.5$, as illustrated in Figure 2. And as shown in Table 4, columns (1) and (2), the Bayesian approach with a rectangular prior produces sample sizes nearly identical to those for classical sampling methods. The following discussion will assume they are equivalent.

Figure 2
Two Prior Distributions, One Equivalent to the Classical Approach and One Bayesian; Implications for Required Sample Size of the Choice of the Maximum Acceptable Error Rate



Further examination of Figure 2 and Table 4 will show the importance of the effect of the relationship between the maximum acceptable error rate and $E(p)$ on the difference between the required sample sizes for classical and Bayesian sampling methods. In Figure 2, there are two Bayesian priors—one rectangular (in effect, a 'classical' prior), and one non-rectangular, with $E(p) = 0.0426$ and $\sigma^2(p) = 0.000108$. Now, consider the point P in Figure 2. This point is defined as that unique point (less than 1.0) where the cumulative probability that the population error rate does not exceed P (the area under the curve to the left of P) is identical for the two distributions. If the acceptance limit (L) equals P , the prior probability that the population is acceptable is the same for both the rectangular and non-rectangular priors, since the cumulative probabilities for the respective distributions are identical up to the point P . If L is greater than P , then the non-rectangular prior provides a greater prior probability that the population is acceptable, since the cumulative probability is now greater for the non-rectangular distribution. Conversely, if L is less than P , then the rectangular distribution provides a greater prior probability that the population is acceptable.

The point of this discussion is to show that the choice of L will determine which of the two distributions will have a greater prior probability that the population is acceptable. And since a greater prior probability of acceptance leads to smaller sample sizes, the choice of L also thereby determines which of the two distributions will require a smaller sample size. This is demonstrated by the results shown in Table 4, columns (2) and (3). The required sample size for the non-rectangular (Bayesian) prior distribution is somewhat greater than that required for the rectangular (classical) prior when $L = 0.02$. The converse is true when $L = 0.10$. At the point $L = 0.05$ the required sample sizes are comparable.

Overall, these results show that, when the acceptance limit (L) is close to $E(p)$, classical methods may require fewer sample items than Bayesian methods. Alternatively, when $E(p)$ is somewhat less than L , the Bayesian method will require fewer sample items than the classical methods.

Notice also by comparing columns (4)–(5) with columns (2)–(3) that the same relationships obtain for either an assumed sample error rate of zero, one percent, or (it can be shown) for any fixed proportion less than L .

Table 4 Effect of Changes in the Maximum Acceptable Error Rate on Required Sample Size for Classical and Bayesian Sampling**					
Maximum Acceptable Error Rate	Desired Reliability	Assume Sample Error Rate = 0		Required Sample Size	
		(1) Classical Binomial Sampling*	(2) Bayesian Rectangular Beta Prior, E(p) = 0.5	(3) Bayesian Nonrectangular Beta Prior, E(p) = 0.0426	(4) Bayesian Rectangular Beta Prior, E(p) = 0.5
0.02	0.95	149	148	772	566
	0.90	114	113	683	391
	0.75	69	68	548	185
0.05	0.95	59	57	83	88
	0.90	45	44	48	66
	0.75	28	26	-0-	36
0.10	0.95	29	27	-0-	34
	0.90	22	20	-0-	26
	0.75	14	12	-0-	13
*Excerpted from: Kaufman, Stuart F., "Sampling for Zero Defectives," <i>Journal of Accountancy</i> , October 1968, pp. 66-68. This is the sample size for binomial sampling with an assumed zero defective rate in the sample. **The sample sizes in columns (2)-(5) were obtained by use of a computer program, in the same manner as for the values in Table 3.					

The above discussion is not intended as a basis to determine when a Bayesian or classical approach is appropriate. The Bayesian approach is always preferred on the basis of its ability to combine systematically the sample and the non-sample information. However, while the Bayesian approach generally leads to smaller required sample sizes than the classical approach, the opposite is true when the mean of the prior probability distribution is somewhat close to L . This provides a basis for comparing the two methods with respect to required sample size, which is one of the important factors in the audit sampling decision.

Summary

This study has evaluated the effect on required sample size of selected changes in the factors involved in Bayesian audit sampling for attributes—the mean and variance of the prior probability distribution, the required test reliability, and the maximum acceptable error rate. Though all factors have an impact on sample size, it appears that the mean and variance of the prior probability distribution have less effect than the other factors. The paper concludes with an analysis which shows that the level of the maximum acceptable error rate, relative to the mean of the prior distribution, can have an important effect on the difference between the sample sizes for classical and Bayesian attribute sampling methods.

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A Case for Depreciation Accounting in UK Health Authorities

Irvine Lapsley

The question of whether Health Authorities (HAs)¹ should or should not capitalise and depreciate their assets and record this in their financial reports² is a complex affair. The issue of its relevance to the annual accounts of HAs has not been formally addressed by either the Department of Health and Social Security (DHSS) or HM Treasury. However, current policies recommend that the only part of central government departments³ which should have capital asset accounting are trading bodies (HM Treasury, 1974, 1978).⁴ Therefore, this discussion is of interest as an example of a major sector of the economy departing from mainstream accounting practices because of its classification as a non-profit-making activity.

¹The HAs to which reference is made throughout this paper are Regional Health Authorities. For details of the organisation structure of the NHS see DHSS, 1972 and 1980.

²The annual accounts of HAs are prepared in accordance with directives ('circulars') received from the DHSS, under section 6(i) of the NHS Financial (No. 2) Regulations of 1974. The current directive is the 'Manual of Accounts' system issued under cover of DHSS circular HN(77)21 in February 1977. This requires HAs to produce a summary (*sic*) income and expenditure account, which sets out a 'Revenue Account' and a 'Capital Account'. The Capital Account consists of two subheads, one for income (sundry) and one for expenditure. The capital expenditure is that incurred in the current fiscal year.

³It might appear somewhat anachronistic to describe HAs as part of central government since the reorganisation of the NHS in 1974. Before its implementation, the DHSS had a more active role in management and the local management units (Regional Hospital Boards, Hospital Management Committees) had little autonomy. However, under the 1973 NHS Reorganisation Act, the HAs were created and accorded the formal status of statutory corporations (s.8, Part III, Sch 1). Nevertheless, the HAs are almost totally financed by central government allocations (for example, in 1975, 1976 and 1977 nongovernmental sources of finance for NHS capital expenditure were respectively 1.7%, 1.07% and 1.9% of its total capital finance: *source*, Summarised Accounts of Health Authorities, England and Wales, 1975-1977) and the general principle behind this policy of devolution is that '...there should be maximum decentralisation and delegation of decision making, but within policies established at national, regional and area levels [emphasis inserted]...' (DHSS, 1972).

⁴Thus the Royal Ordnance Factories, for example, employ 'best commercial practice' in their financial reports.

It is demonstrated within this paper that HAs should adopt capital asset accounting despite the fact that they do not trade for profit. This would provide essential information on the availability of health care facilities in the different geographical regions of the country. Furthermore, the DHSS has intimated its intention to use a capital asset measure in the allocation of capital funds between HAs (DHSS, 1976). Therefore, capital asset accounting by HAs would provide a means of monitoring the effectiveness of this policy.⁵ This paper presents the case for such an integration of HA financial reporting and central government resource allocation in two parts. Firstly, it is shown that

(a) the approach to allocation advocated by the Resource Allocation Working Party (RAWP) is superior to other alternatives for the NHS and

(b) a RAWP-type capital asset measure is appropriate to the circumstances of the NHS.

In the second part, it is shown how an integration of HA financial reporting and resource allocation might actually be achieved.

Alternative systems of allocating capital: equity v efficiency

The major alternatives which might be utilised in the allocation of resources in the NHS are set out in Table 1. A fundamental distinction is drawn between the aims of equity and efficiency

⁵This paper is confined to discussion of the allocation of resources to HAs by central government. The omission of any detailed discussion of sub-regional resource allocation reflects the constraints of space and not a belief that the issue is unimportant. The RAWP system has been criticised as being too coarse for use within HAs (Bevan *et al.*, 1980, p. 156) and, indeed, it is. However, this criticism confuses the allocation of funds between HAs (RAWP) with allocations within HAs (HA planning systems). The capital asset measure also has a potentially important role to play in the integration of HA planning and financial reporting (see Lapsley, 1980, particularly Appendices B and C).

Table 1

Alternative means of allocating Capital Funds in the NHS

<i>Aim</i> <i>Type</i>	(a) <i>Equity</i>	(b) <i>Efficiency</i>
<i>Financial</i>	<i>Capital Asset Measures</i>	1. <i>Pricing System</i> 2. <i>Notional Capital Market*</i>
<i>Non-financial</i>	<i>Bed Norms</i>	<i>Health Status Index</i>

*Alternative (b)1, a pricing system, implies access to real capital markets.

in resource allocation. The former would appear to be the most appropriate to HAs. From its inception, the NHS was charged with the responsibility of making health care 'available to everyone regardless of financial means, age, sex, employment or vocation, area of residence or insurance qualification'.⁶ Indeed, the advocacy of the RAWP formula (which combines a measure of capital assets held with the residential population to be saved, weighted for age and sex and Standard Mortality ratios) stems directly from the failure of its predecessors to fulfil this obligation.

The different ethos of efficiency (allocative) which is attributed to the remaining alternatives entails an equal consideration of the supply of, and demand for, health care as a necessary requirement of any allocation system. In this way, the provision of health care would be so organised that greater output would not be possible without greater cost and greater satisfaction of one consumer would be impossible without reducing that of another. This contrasts with the systems classified as 'equitable', which are pre-occupied with the *supply* of health care.

It is shown below that, given the stated aims of the present NHS, and the technical complexities and policy implications associated with the major alternatives, a RAWP type of system is the best available. The 'efficiency' alternatives are considered first, as an appreciation of their defects gives a greater insight into the rationale for the RAWP approach.

Efficiency

The three 'efficiency' alternatives conflict with the basic aim of the nationalised health service of providing health care which is readily accessible to all persons. The first of these, the price mechanism, is unlikely to be used in the NHS for this very reason. Furthermore, the other alternatives represent inadequate alternatives to pricing for

health care which not only fail to provide its benefits, but introduce further, substantive deficiencies.

Financial Alternative (1): The Price Mechanism

The option of resorting to the price mechanism by the introduction of private enterprise or commercially-orientated state enterprise in health care makes the present discussion redundant. Under these circumstances, the capital asset measure would assume at least equal importance to health care institutions as it has for other organisations employing 'best commercial practice'. However, the problems associated with this option are of fundamental importance, as the remaining 'efficiency' alternatives attempt to simulate it, without overcoming its defects.

The implementation of the price mechanism as a means of resolving the allocation problem within the NHS is a response to the nature of the demand function for NHS health care. This is an almost infinite demand at what is effectively a zero price.⁷ Evidence that such pressures of demand exist can be found in a number of studies.⁸ Given these circumstances, the introduc-

⁷The introduction of private insurance policies for health care does not provide a money price for the use of health care facilities. In the first place, the NHS already has an insurance system, which private insurance schemes would not substantially modify, as seen from the perspective of allocative efficiency (Maynard and Ludbrook, 1980). This is because the consumer of a service must be presented with a price (or set of prices by including all alternative locations and treatments) prior to consumption. This condition is not met by either private or national insurance schemes. Under insurance schemes, once the premium is paid, the institution offering insurance meets the bill at, or soon after, the point of consumption and there is no opportunity cost to the individual patient receiving care. Indeed, because of this the effective 'price' charged, as perceived by individual consumers, is zero. In all cases the user price under an insurance policy is less than cost and does not permit the price mechanism to operate and determine the levels of output in health care (Culyer, 1978).

⁸For example, the NHS was planned on the assumption that the improvement in health care resulting from its introduction in 1947 would reduce the demands made upon it as diseases were progressively eliminated. Nine years later, a committee of enquiry reported that this was an illusion (Guillebaud Report, 1956). Furthermore, a study in the 1960s of

⁶See 'The NHS Bill: A Summary of the Proposed Service', Cmd 6761, HMSO, 1946, p. 3.

tion of a pricing system could ration the use of health care facilities and simultaneously assist in the allocation of capital funds.

However, the major difficulty with any such scheme is the fact that its principal advantage is generally considered to be outweighed by an associated disadvantage. Its benefit is the provision of a means by which consumers can register their satisfaction or dissatisfaction with the service they receive by their willingness to pay. This can be extended from the pricing of operational services to the allocation of funds by capital markets in response to the profitability of health care institutions. The disadvantage of this approach is evident. It is not safe to assume that all incomes are equal or that the marginal utility of incomes is constant. In reality, the benefits of greater 'efficiency' of service utilisation and resource allocation would be achieved at the cost of members of society being denied access to health care because they could not afford the price. The political unacceptability of this has meant that successive Governments have shunned this option, which conflicts with the fundamental aim of the NHS as stated above. Instead, the supply of health care is rationed by the imposition of an annual ceiling on expenditure which limits the availability of NHS facilities.

Financial Alternative (2): A Notional Capital Market

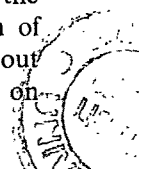
The creation of a notional capital market was seriously considered as a possible means of allocating funds by the Resource Allocation Working Party. Briefly,⁹ such a scheme would involve HAS placing bids for their capital requirements. These bids would be ranked and the available funds in a given fiscal year would be allocated on the basis

of these bids. Successful HAS would pay 'interest' or a 'rent' for capital allocated to them. Such 'interest' or 'rent' charges would be accumulated from capital-recipients and then re-allocated to all HAS, including those which did not receive capital or at least less than they bid for, on the basis of some formula.

However, the notional capital market alternative is essentially misconceived. It seeks to resolve the allocation problem in the NHS by providing an apparatus analogous to that of the private sector capital market, without the benefit of the private sector's price mechanism, which identifies profitable opportunities for investments. That is, it confuses the *means* of allocation with the device which makes such allocations possible in the private sector. Since its purpose is not to function in the manner of a real capital market by raising some absolute level of finance for NHS expenditure—this will be determined politically, given the acceptance of the NHS as presently instituted—its success will hinge on the effectiveness of the means of ranking bids as a satisfactory surrogate for the price mechanism. The criterion by which it was suggested that allocations should be made under this scheme was that of a DCF calculation of the cost of capital which equalises cost savings of a given project with its capital cost. Capital would then be allocated to bidders with the highest cost of capital until the monies voted to the DHSS by Parliament for capital expenditure were exhausted. The DCF rate at which successful capital recipients bid for funds would be computed as a percentage of their actual capital allocation and deducted from their revenue budgets. However, this presumes that all potential capital projects fall into the cost-saving category, which ignores completely fresh developments in which no cost savings are generated. Furthermore, like the pricing system, this scheme is inconsistent with considerations of equity. It poses a severe dilemma for underprovided HAS in need of resources. Their ability to sacrifice revenue is constrained by their relatively smaller budgets, limiting the level of revenue which they could afford to sacrifice to pay 'interest' or 'rent' charges and possibly perpetuating inequities in resource-availability. The alleviation of this problem by, for example, dividing the capital funds available for allocation by the DHSS into a 'biddable' sum for underprovided HAS and a further sum for all HAS does not resolve this issue but merely transfers the difficulties of devising a satisfactory criterion of resource-allocation to the second sum, without overcoming the impact of a 'bidding' system on

NHS facilities in England concluded that the demand for health care was very much influenced by supply (Feldstein, 1964). This revealed that there was no level of supply at which demand for bed days in hospital would be satisfied; there was no critical level of supply beyond which demand for admissions no longer increased and although unsatisfied demand (measured as persons on waiting lists per 1,000 population) was less in regions where hospital beds were more amply available, the effect of supply was too small to make the reduction of waiting lists a suitable criterion for the provision of health care facilities. These findings have been corroborated by studies by Culyer and Cullis (1975, 1976). More recently, the Royal Commission on the NHS also reported on the effect of medical advances increasing, rather than reducing, demand for health care (Merrison Report, 1979). An example of this is that increased life expectancy has increased the need for geriatric services and long term care facilities for the elderly.

⁹Pressures of space do not permit a detailed exposition of how such a market might operate. For more details see Perrin (1978).



under-provided HAs, as outlined above. Also, since the funding system in the NHS is a closed one, in the sense that no outside parties will receive the notional 'interest' or 'rental' charges, these must be recycled to HAs or be lost to the NHS. Therefore, the problem still remains of devising a satisfactory yardstick—in this case for the redistribution of accumulations of such charges.

A Non-Financial Alternative: The Health Status Index (HSI)

The aim of the HSI is to measure patient welfare. It has been subject to considerable research without the construction of a generally accepted index.¹⁰ This index is not a direct device for the allocation of capital funds of the same type as the notional capital market. Instead, it corresponds to the price mechanism, i.e., just as profitable health care institutions would attract fresh capital under that régime, so would health care institutions with a high HSI. Alternatively, the HSI could be used as part of the RAWP formula, replacing the present use of mortality rates in that formula. However, it could only be used for the equitable allocation of resources if it was weighted by both the population to be served and the capital assets employed. Therefore discussion is confined to its rôle as a surrogate for the price mechanism. In any event, as shown below, the difficulties in its construction obviously inhibit the refinement of the measure of need in RAWP.

The HSI attempts to correspond to the pricing model. Its aim is to measure patient welfare and satisfaction with treatment received. In this way, the HSI might provide a proxy for the 'willingness to pay' measure of money prices. However, the major advantage of using money prices is that they provide a detached, efficient mechanism which determines output levels. This contrasts

with an HSI, which is not determined by factors external to the NHS. In this case, the measure is dependent upon the clinicians within the system, who not only prescribe treatments, but also assess the effectiveness of this treatment. The construction of an HSI initially entails comparisons between the well-being of different patients suffering from a particular illness in different hospitals and regions and this alone poses formidable difficulties. Such judgements of the state of a patient's well-being and the effectiveness of prescribed treatments can be severely hampered by the fact that a number of different treatments are frequently possible for the same illness. Furthermore, there are major exogenous factors influencing the course of health care which complicate clinicians' judgements. This includes such considerations as the state of health of the patient prior to illness, which is itself subject to the influence of diverse matters—hereditary, dietary and other aspects of the patient's life style. These difficulties are accentuated if the HSI is extended beyond individual illnesses to provide a truly general index which would allow comparisons between all illnesses *within* specific areas of health care, such as acute or geriatric services, and *between* these different types of health care, regardless of the patient's location. To enable such comparisons to be made it is necessary for clinicians to cooperate in the construction of an HSI by deciding, not only on the trade-offs between the well-being associated with the treatment of one particular illness relative to that of another, but also on the magnitude of the incremental benefit associated with the treatment of one illness or patient care group relative to another.

The HSI is therefore heavily dependent on the internal criteria of the clinician in fulfilling his dual role of prescription and evaluation of medical treatment. In effect, the clinicians are functioning as a surrogate market place. Although there are shadow prices implicit in the ordering of different medical treatments, the primary use of the HSI would be in determining the quantity side of the price-quantity relationship for these different treatments. In this way, the HSI loses all the objectivity of the pricing system—there can be no determination of the economic worth of a particular service when the decision-maker(s) regarding consumption are also the providers of that service. This would hold regardless of whether the implicit notional prices made as a by-product of the HSI were made explicit or not. This criticism might be moderated if such prices were actually charged. However, as a bureaucratic attempt at

¹⁰An early attempt at an HSI was made by Chiang (1965). This included three factors: frequency of illness, duration of illness and death rate during the year. However, it assumes all illnesses are of equal severity and ignores links between present and previous illnesses and between illness and death. The difficulties of constructing a general index have led to attempts at indices for specific aspects of health care, e.g. the Fanshel and Bush (1970) index for monitoring TB. It has also led to models covering limited time periods, e.g. Rosser and Watts (1972) short term ('sanative') measure of patient welfare based on the time between a patient's entry at hospital and his first outpatient visit, plus an evaluation of patient disability and distress by clinicians. Furthermore, a study of commonly used indices of health care by Black and Pole (1975) found that each implied different priorities and that there was no objective means of aggregating or ranking them. More recently, Rosser and Watts (1978) have shown that available data on states of illness offer little improvement over mortality statistics at the community level of health care for planning purposes.

providing a market place for health care, it is questionable if it produces any benefits which could not be obtained more efficiently by charging monetary prices determined by the price mechanism—assuming the policy makers found this acceptable.

Equity

The fact that there is a need for a system of allocating capital funds which will provide an equitable distribution of resources between HAs is not in serious dispute.¹¹ The RAWP system of achieving this has not escaped criticism, but it offers a fundamental improvement over previous systems of allocation. Not only that, the criticisms made can be taken account of by suitable modifications.¹² A particular criticism of direct relevance to the subject matter of this paper is the inaccuracy of the capital asset measure incorporated in the RAWP formula for the allocation of capital funds (Bevan *et al.*, 1980, p. 199). This inaccuracy is conceded here. However, it is shown that, not only is the measure adopted conceptually appropriate, but also that an improved measure can be achieved. This is demonstrated by assessing the capital asset measure proposed by RAWP against non-financial and financial alternatives.

A Non-Financial Index of Capital Stock

The single most evident non-financial measure of capital stock, which is frequently employed

within the health service in policy discussions, is that of the number of beds per head of population in a given HA. This is an inadequate alternative to the capital asset measure because it offers no information on the *vintage* of hospitals. For example, present day hospitals include those of modern construction; Victorian hospitals; indeed even those constructed specifically for short term use during wartime to ease pressure on the hospital services, but which continue in use. The differences in style and design of those hospitals can lead to obsolescence because of differences in running cost and, indeed, in their ability to allow the practice of modern health care. Also, this is an incomplete measure of the capital assets used in the provision of health care.¹³ Furthermore, because of the heterogeneity of the assets employed in the health service, the 'bed norm' cannot be aggregated with other types of assets to provide a meaningful measure of the total resources employed in health care, in the way that capital asset measures can. Therefore, an apparent equality of resource-availability between HAs on the basis of numbers of beds might be a distortion of the exact nature of assets held by the different HAs.

RAWP v 'Allocation-Free' Measures of Capital

In this section it is shown that, not only is the capital asset measure adopted by RAWP comparable to that recommended by SSAP16, but also that this measure is the most appropriate to the circumstances of HAs. However, it is doubtful if RAWP's actual measures of capital employed by the HAs are accurate. Nevertheless, the means of deriving more accurate measures are indicated. Finally, it is shown that 'allocation-free' accounting measures (including the status quo in HA accounts) provide misleading information.

SSAP16 recommends the use of deprival value as the criterion by which capital asset measures should be derived. It defines this as follows:

- (a) the net current replacement cost; or if a permanent diminution in the value of the asset to

¹¹There were disparities in the availability of resources per capita in the different regions of the UK before the health service was nationalised. Anomalies on resource availability have persisted because of the allocation formula used after the NHS was created in 1948. This was based on the previous year's allocation of funds, plus some additional amount for the effects of inflation and growth. The initial, and subsequent, allocations were therefore based on the funds required by the services in existence at the date of their nationalisation. This perpetuated the inequities of health care facilities provided at that time: the better equipped regions as measured by resource availability per capita gained at the expense of poorly equipped regions. In 1970, an attempt was made to reduce such differentials by R. Crossman, then Secretary of State for Health, with a revised allocation formula. The failure of this scheme of allocation to reduce regional disparities (see Noyce *et al.*, 1974) gave impetus to the development of RAWP.

¹²One such criticism is the failure of RAWP to take account of HAs providing health care for residents of other HAs ('cross-boundary flows'). However, these could be incorporated by making prior charges against the national allocation for regional specialities giving rise to cross-boundary flows. One criticism of RAWP which cannot be modified in the foreseeable future is its use of mortality ratios instead of an HSI which measures morbidity. However, this offers an improvement over previous systems for allocation; there is no measure of morbidity currently available; and key decisions have to be made in the interim. Therefore any such criticism is somewhat unrealistic.

¹³On the nature of the assets employed in the NHS, Perrin (1978) made the observation that the equipment employed in modern health care is increasingly complex, sophisticated and costly. It is expected that this form of equipment will form an increasing proportion of the total assets held by HAs (Merrison, 1979). Examples of areas of rapid technological advance in costly medical equipment include ultra-sound and radio-isotope scanning, mass spectrometry, radio-immunology, renal support systems and incubators for premature babies. Also, there are many other types of (depreciable) HA assets: for example, computers, ambulance fleets, hospital lifts, boilers and fittings.

below net replacement cost has been recognised:

(b) its recoverable amount.

This closely corresponds to the measure utilised by RAWP in its formula for allocating capital funds. This basically valued HA capital assets at replacement cost, written down to reflect differences in age and condition. Those assets which had been downgraded were recorded at less than NRC—in effect, an attempt at ‘recoverable amount’.

Thus, if the SSAP16 basis of valuation were adopted by HAs it would offer potential for integration with the RAWP formula. Furthermore, it is particularly appropriate, because the typical basis of valuation is net current replacement cost, a supply-based concept. It implies continuity of supply and stability in the provision of services. This corresponds to the situation in HAs which face virtually an infinite demand for their services (subject to resource constraints) in the light of the basic aim of equity in the provision of health care.

However, the actual estimates of the replacement cost of capital employed in HAs made by RAWP are almost certainly significantly inaccurate. In the absence of such valuations in the accounts of HAs, the DHSS had to produce its own estimates. These were based on poor data for both hospital buildings and supporting facilities and equipment. Its principal source of data for hospitals was a 1972 Hospital Maintenance Survey for the period to 1961, plus subsequent capital expenditure to 1975. This survey only provided information on floor area and, broadly speaking, the age of hospitals. However, there was no information available on the condition of such hospitals or their location—a crucial element in estimating their worth to the HA and the community. If there have been substantial shifts in the population away from a hospital's location, it is of less value as it is unlikely to be replaced with a modern equivalent in the face of a declining demand. Furthermore, this survey was incomplete as it only had an 80% response rate. While an estimate for support facilities was also made, this must have been highly subjective. The knowledge of such facilities at the DHSS must have been limited. Indeed, even at HAs, the lack of data would have thwarted the derivation of an accurate measure (see Lapsley, 1978).

A major difficulty in such estimates is the attempt to derive a detailed figure at the centre, when the outlying regions have inadequate records of assets held. In this respect, occasional

surveys of assets held are of little value compared to up-to-date records. This deficiency might easily be remedied by the maintenance of asset registers at HAs. Furthermore the valuation of assets held by HAs could be carried out, in detail, at HAs instead of resorting to broadbrush measures based on occasional national surveys. Certainly, the availability of suitable replacement cost measures for HA assets is not a major difficulty. For example, suppliers' official price lists or catalogues would provide replacement costs for items of equipment. As for hospital buildings, a nationally available register of the specification and construction cost of the most recently completed hospital buildings in the UK would provide an adequate measure of the modern equivalent asset. In the event of gaps in such building programmes, whether by time or by category of buildings, indices of the costs of the construction industry could be employed to update the replacement cost of those assets. However, the usefulness of such measures of capital assets has been the subject of criticism from the school of thought which seeks an ‘allocation-free’ accounting system. This minority view has been expressed by Thomas (1969; 1975; 1979) and Lee (1972; 1980) for commercial organisations and by Hicks (1980) specifically for nonprofit organisations. The basic criticism made by this school is that depreciation accounting entails allocations of costs to particular periods of time, that allocations are arbitrary and, therefore, that a more ‘neutral’ form of accounting is required. The alternatives proposed are cash flow or net realisable values, or some mixture of both (Hicks, 1980; Lee, 1980).

In this respect, cash flow accounting is the status quo in HA financial reporting. The major deficiency of this accounting system is that, in seeking to overcome the allocation problems associated with capital assets, it leaves the organisation with an inadequate measure of its resources. The consequences of this have been set out in the preceding section on resource allocation by central government. The absence of a measure of assets held by HAs meant it was not possible readily to detect which regions were under- or over-provided with resources relative to the demands which they faced for their services. The continuation of the status quo in financial reporting will perpetuate the possibility of such anomalies.

The other ‘allocation-free’ method, net realisable value accounting, also provides misleading information. The basic notion of this concept is that it is a ‘neutral’ measure, provided by the mar-

ket-place. However, while this might be pertinent to commercial concerns in which there are active product and capital goods markets, it has limited relevance for HAs. Indeed, the major drawback of NRV accounting for HAs is the thinness or non-existence of the market for second-hand hospital assets. Hospitals are not only designed in a specialised way, but also the sheer demand for health care is such that hospital buildings continue in use until they become obsolete, for example, by a decline in the local population to be served. In other words, there are few potential buyers of hospitals and few hospitals are available for sale. Under normal operating circumstances, not only would NRVs be difficult to obtain for all hospitals in a given HA, but they would also be a misleading indicator of the value of these assets to the HA and to the local community. To a lesser extent, these reservations also hold true for hospital equipment, particularly highly specialised and costly medical equipment. However, other types of equipment, including motor vehicles, ambulances and office equipment, might not be subject to the lack of a market for second hand items. Therefore the relevance of this measure is confined to (a) minor assets and (b) principal assets which have become obsolete. Indeed, this would be the typical measure of such assets valued at 'recoverable amount' under SSAP16, as, unlike commercial organisations, HAs have no measure of economic value (EV) and, therefore, it is not possible to measure 'recoverable amount' as the higher of EV or NRV.

Monitoring resource availability in HAs

It has been shown above that the SSAP16 basis of asset valuation is the best index of the capital assets held by HAs. When this is linked to the population to be served by a given HA, it is possible to determine if equality of access to health care facilities exists. Therefore, this provides information of fundamental importance to consumers, HAs, Members of HAs, the DHSS, Members of Parliament and the Secretary of State for Health, on whether HAs are able to fulfil the NHS aim of equity in access to health care. Furthermore, if HAs adopted the SSAP16 basis of asset valuation, this would provide a means of monitoring the effectiveness of (a refined) RAWP in redistributing such resources within the NHS. Inequities in available facilities could be pinpointed and the rate of equalisation (by accretion or depletion of

capital assets) could be determined.¹⁴ The continued reporting of such information would also reveal whether the effects of the RAWP formula persisted, or whether 'equalisation' was merely a temporary phenomenon. The details of a possible integration of allocation and financial reporting are now outlined.

Each HA would receive its annual allocation of funds from the DHSS, as at present.¹⁵ This would be seen as consisting of three possible constituent elements: (a) funds for the payment of labour and materials; (b) a depreciation charge, the amount necessary to maintain the HA's capital assets; (c) a possible additional amount representing capital growth, which is effectively additional capital contributed by the Secretary of State. In a 'steady state' situation, an HA would only receive amounts for items (a) and (b) above, with the HA's 'capital allocation' equal to its depreciation charge as sufficient funds for the maintenance of its capital assets. If the HA is experiencing a depletion of its capital, in line with current Government policy of an equitable distribution of health care facilities, some *proportion* of the depreciation charge will represent the finance made available for capital expenditure in the year; the remaining element is a reduction of the capital contributed by the Secretary of State. The potential for this integration of depreciation accounting within the existing allocation system can be demonstrated if three hypothetical HAs are considered: (1) which has a growing capital allocation, (2) which is static and (3) which has a declining capital allocation. It is further assumed that in this first year of

¹⁴It is uncertain as to what this actual rate would be. It is now over 30 years since the inception of the NHS and inequities remain. It was estimated at the time of the Crossman formula (1970) that equity would be achieved in 10 years. A similar timespan was estimated by RAWP (1976). However, the information on which the RAWP decision was taken was dubious, as noted above. Furthermore, the slow rate of growth planned for the public sector will no doubt inhibit equalisation (Merrison, p. 54). Also, see Brookes (1980) cited below in the main text of this paper.

¹⁵It is important to note that this is based on *existing* allocations: there is no question of depreciation accounting entailing tax-raising or borrowing additional to that already decided by Parliament in a given year. This is a typical criticism of the introduction of depreciation accounting in non-profit organisations, i.e. an unfair burden (of extra charges) might be imposed on the existing generation of consumers to the benefit of future generations (Crick, 1950; Jayaratne 1977). There are two ways in which this might happen: (i) an existing proxy for depreciation might be used, in which case a double charge might be made, i.e. depreciation plus the proxy (cf. Local Authority loan charges, CIPFA, 1975); (ii) the organisation might be a monopolist which can introduce the additional cost of depreciation into its cost base for charging, at a rate higher than that necessary for capital maintenance. However, HAs have neither a proxy for depreciation, nor independent revenue-raising powers.

Table 2

Abbreviated Financial Statements for Three Hypothetical Health Authorities

	HA (1) (growth)	HA (2) (steady state)	HA (3) (decline)
(a) <i>Income Statements</i>	£m	£m	£m
Income	310	310	250
Labour	100	100	100
Materials	100	100	100
Depreciation	110	110	110
	<u>310</u>	<u>310</u>	<u>310</u>
Surplus/(Deficit)	<u>—</u>	<u>—</u>	<u>(60)</u>
(b) <i>Balance Sheets</i>			
Initial assets (replacement cost)	550	550	550
Capital expenditure:			
—maintenance	110	110	50
—growth	200	—	—
	<u>860</u>	<u>660</u>	<u>600</u>
Depreciation, current year	(110)	(110)	(110)
Net assets employed	<u>750</u>	<u>550</u>	<u>490</u>
Financed by:			
Capital contributed, Secretary of State			
original	500	500	500
additions	200	—	—
	<u>700</u>	<u>500</u>	<u>500</u>
Revaluation reserve	50	50	50
Surplus/(Deficit) on revenue	—	—	(60)
Total	<u>750</u>	<u>550</u>	<u>490</u>

Note: This assumes that no additional charge is made for depreciation in the first year for the current year's capital expenditure. If capital acquisitions were, for example, items of equipment acquired at the beginning of the year, rather than building under construction, an additional depreciation charge could be made which would reduce this element of fixed assets.

depreciation accounting, each HA has capital assets at the start of the year with a replacement cost of £500 million (i.e. capital contributed by the Secretary of State) and a replacement cost of £550 million at the end of this year. Each HA receives an allocation of funds as follows: (1) £510 million (£200 million for running costs other than depreciation; £310 million for capital expenditure, of which £200 million is growth); (2) £310 million (£200 million for running costs other than depreciation, £110 million for the maintenance of capital assets); (3) £250 million (£200 million for running costs other than depreciation, £50 million for the maintenance of capital assets). The implications of such a scheme are shown in Table 2. It has been suggested by Brookes (1980) that, in recent years, successive Governments have failed to maintain the capital assets provided for health care by earlier generations by inadequate capital replacement programmes. This might make the third HA the typical situation. In this case

Members of HAs, the DHSS, Ministers of State, Members of Parliament and other potential users of such information would have to focus on the *relative* decline of HA allocations and assets held.

Conclusion

This paper supports the adoption of the RAWP method of allocating capital funds to HAs. Its combination of capital asset valuations (as a measure of resources held) and the population to be served (as a measure of need) fits the stated aim of the NHS of providing equity in health care better than alternative methods of allocation. An apparent defect of this approach is its failure to include a measure of morbidity in the allocation formula. However, this criticism of RAWP is of little substance, as no such measure is currently available and, if it was, it could be incorporated without difficulty. An actual defect of the RAWP formula is its reliance on dubious estimates of

capital assets held by HAs. However, this is a reflection of the source of data, not the concept of measurement. This weakness can best be remedied by the maintenance of detailed records, and the regular valuation of assets held, at HAs.¹⁶ Furthermore, it has been shown that assets held by HAs, combined with RAWP-style details of the population to be served, should be reported upon a regular basis. This would not only provide a means of monitoring the effectiveness of RAWP allocations, but also a basis of comparing the availability of health care facilities in the different regions of the country.

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¹⁶One issue which has not been explored is the cost of the implementation of depreciation accounting by HAs which is outwith the scope of this paper. However, it would be possible to estimate its costs by testing its implementation in a single HA—a normal practice in the NHS.

The Impact of Stock Relief on the Attractiveness of Capital Investment Opportunities

J. C. Hull

Introduction

The effect of the UK system of capital allowances on the attractiveness of capital investment proposals is frequently emphasised in text books and elsewhere (see, for example, Franks and Broyles, 1979). The impact of these allowances on the leasing decision is also now well understood (see, for example, Clark, 1978). Other effects of taxation on capital investment have also received attention in the literature. For example, Grundy and Burns (1979) in a recent article show that tax alone can lead to the total NPV from two projects being either greater than or less than the sum of their individual NPVs. Up to now, however, relatively little has been written about the impact of stock relief on capital investment decisions.

Stock relief is a provision whereby increases in the value of a company's stock during an accounting period can lead to a reduction in its taxable profits for the period. A form of stock relief was first introduced in 1973, primarily to avoid the illiquidity effects of the taxation of holding gains during periods of high inflation. At the time of writing (1980), the provision is based on the 1976 Finance Act (Schedule 5).

The effect of stock relief for a company is to reduce its taxable profits for a period by the excess of the closing stock value over the opening stock value less 15% of the 'relevant income' for the period. Relevant income is income computed under Schedule D, Case I or II after capital allowances and balancing charges but before relief for losses.

If the closing stock value for an accounting period is actually less than the opening stock value the Inland Revenue can 'claw back' previously granted stock relief. Taxable profits for the period are increased by the lesser of (a) the whole of the amount of the stock reduction and (b) the amount of unrecovered past relief. (In this

sense the effect of the provision is only to defer tax). The 1979 Finance Act (Schedule 2) introduced a slight modification to this rule which has the effect of making stock relief permanent (i.e. not recoverable by the Inland Revenue) once 6 years have passed. The 1980 Finance Act includes a further change to the 'claw back' rule. If stocks have been temporarily reduced at the year end, part of the recovery of stock relief can under certain conditions be deferred for one year.

Usually a new capital investment proposal affects both a company's stock level and its relevant income. The calculation of the incremental cash flows arising from the stock relief provision is therefore not completely straightforward. This article will show that although the existence of stock relief does sometimes increase the attractiveness of an investment proposal it can have the opposite effect by reducing the benefits which the company would otherwise obtain from stock relief on the rest of its activities.

As our basic examples we shall consider two investment proposals. Project X, a cost reduction project, involves no investment in working capital and has the following characteristics:

Initial investment in plant and machinery	£100,000
Life of project	5 years
Incremental operating cash inflows p.a. (if no inflation)	£40,000

Project Y, a project involving expansion into a new market, is similar to project X except that it involves the following investments in working capital:

Initial investment in stock	£30,000
Initial investment in other working capital	£10,000

For both projects it will be assumed that the

plant and machinery has no residual value. A tax rate of 52% with a 1 year time lag between profits being earned and taxes being paid will also be assumed. In the case of Project Y it will be assumed that all working capital is recovered in year 5. We shall restrict our attention throughout to companies where total stock is expected to increase in value every year with or without the projects. (This means that the rather complicated claw back provisions described above do not become operative).

Tax paying companies

Consider first a company with large taxable profits for the whole of the life of the projects. Table 1 assumes a discount rate of 5% and shows the incremental cash flows for the two projects in the absence of inflation. In the case of Project X the stock relief cash flows arise from the fact that in year 0 the relevant income is reduced by £100,000 and in years 1 to 5 it is increased by £40,000 p.a. The net effect of stock relief is negative and it is easy to see that this will always be the case for projects such as Project X which involve no investment in working capital and are worth doing. Using the following notation:

- C = initial capital investment
- X_i = cash inflow in year i
- r = discount rate
- n = life of project
- T = tax rate,

the present value, V , of the pre-tax cash flows is given by:

$$V = -C + \sum_{i=1}^n \frac{X_i}{(1+r)^i}$$

If the capital investment is all subject to first year capital allowances, the present value, U , of the non-stock relief incremental tax cash flows is given by:

$$U = \frac{TC}{1+r} - \sum_{i=2}^{n+1} \frac{TX_{i-1}}{(1+r)^i}$$

$$= -\frac{TV}{1+r}$$

and the present value, W , of the incremental cash flows arising from stock relief is given by:

$$W = \frac{0.15 TC}{1+r} - \sum_{i=2}^{n+1} \frac{0.15 TX_{i-1}}{(1+r)^i}$$

$$= -\frac{0.15 TV}{1+r}$$

The overall present value of the project is

$$V \left[1 - \frac{1.15 T}{1+r} \right]$$

and the effect of stock relief is to reduce a positive NPV or increase a negative NPV by

$$\frac{15 T}{1+r-T} \%$$

of its pre-stock relief value. With $r = 0.05$ and $T = 0.52$ this percentage is 14.7.

If not all of the initial investment qualifies for first year capital allowances

$$U < -\frac{TV}{1+r}$$

$$W = 0.15 U$$

and it is still true that W is always negative when the investment has a positive NPV.

The extra cash flows for project Y in Table 1 include a row showing the impact of the incremental investment in stock on the company's stock relief. (Note that the negative figure for year 6 is not a result of tax claw backs; it is a reflection of the fact that a reduction in the stock associated with project Y reduces the amount of the stock relief which the company could otherwise claim.)

Table 1 shows that the overall effect of stock relief is still negative in the case of project Y. (It reduces NPV by £2,200, i.e. $-5400 + 3200$.) Clearly, for any given project which is worth undertaking, the incremental investment in stock must be above a certain minimum level before the overall impact of stock relief is favourable. (For project Y in Table 1 this minimum level is about £50,000.)

Consider next the impact of inflation. Table 2 assumes that all costs, all prices and the company's investment in working capital increase at a general rate of inflation of 10%. To be consistent with Table 1 a discount rate of 15.5% has been assumed. As far as project X is concerned the situation is fairly straightforward. In years 2-6, inflation causes the adverse effect of stock relief to be greater in money terms (because of the effect of the increased operating cash flows on relevant income) but in real terms the effect is actually less (because of the 1 year tax time lag).

Project Y's operating cash flows are greater than those of project X because of holding gains on stock. These holding gains are taxable and increase relevant income. The net effect of the stock relief on the 'inflation-related' investments in stock is to eliminate 85% of the tax on holding

Table 1

Cash Flows from Projects if Company Pays Tax Assuming No Inflation and a Discount Rate of 5% (£000s)

	Year							PV
	0	1	2	3	4	5	6	
Project X Cash Flows								
Initial investment	-100.0							-100.0
Operating cash flows		+40.0	+40.0	+40.0	+40.0	+40.0		+173.2
Tax benefits of capital allowance		+52.0						+49.5
Tax on operating cash flows			-20.8	-20.8	-20.8	-20.8	-20.8	-85.8
Tax effect of stock relief		+7.8*	-3.1	-3.1	-3.1	-3.1	-3.1	-5.4
Total cash flows of project X	-100.0	+99.8	+16.1	+16.1	+16.1	+16.1	-23.9	+31.5
Project Y's Additional Cash Flows								
Investment in stock	-30.0					+30.0		-6.5
Other working capital	-10.0					+10.0		-2.2
Extra tax effect of stock relief		+15.6					-15.6	+3.2
Total cash flows of project Y	-140.0	+115.4	+16.1	+16.1	+16.1	+66.1	-39.5	+26.0

* $100 \times 15\% \times 52\%$.

gains. The cash flows arising from these 'inflation-related' investments in stock are only between £1000 and £2000 p.a. and have a total present value of £4500. This is less than the tax effect of stock relief on project X which involves no investment in stock.

Companies in a temporary non-tax paying position

Consider next the situation where the company is not in a tax paying position in the year in which

the investment is made but expects to be so in subsequent years (we assume that the year 0 tax loss arises from operations in year 0 rather than from tax loss carry forwards). Here the effect of stock relief can be quite dramatic. This is essentially because, if a company has a (pre-stock relief) tax loss from operations in a particular year, the relevant income for that year is zero. Furthermore tax losses cannot be carried forward to future years for the purposes of the calculation of relevant income.

Table 3 shows the cash flows for both project X

Table 2

Cash Flows from Projects if Company Pays Tax Assuming an Inflation Rate of 10% and a Discount Rate of 15.5% (£000s)

	Year							PV
	0	1	2	3	4	5	6	
Project X Cash Flows								
Initial investment	-100.0							-100.0
Operating cash flows		+44.0	+48.4	+53.2	+58.6	+64.4		+173.2
Tax benefits of capital allowance		+52.0						+45.0
Tax on operating cash flows			-22.9	-25.2	-27.7	-30.4	-33.5	-78.0
Tax effect of stock relief		+7.8	-3.4	-3.8	-4.1	-4.6	-5.0	-4.9
Total cash flows of project X	-100.0	+103.8	+22.1	+24.2	+26.8	+29.4	-38.5	+35.3
Project Y's Additional Cash Flows								
Investment in stock	-30.0	-3.0	-3.3	-3.6	-4.0	+43.9		-18.3
Investment in other working capital	-10.0	-1.0	-1.1	-1.2	-1.3	+14.6		-6.1
Extra operating cash flow from holding gains		+3.0	+3.3	+3.6	+4.0	+4.4		+11.8
Tax on extra operating cash flow			-1.6	-1.7	-1.9	-2.1	-2.3	-5.3
Extra tax effect of stock relief*		+15.6	+1.3	+1.5	+1.6	+1.8	-23.2	+7.4
Total cash flows of project Y	-140.0	+118.4	+20.7	+22.8	+25.2	+92.0	-64.0	+24.8

*Includes the effect of the increased operating cash flow on relevant income

Table 3

Cash Flows from Projects Assuming a Tax Loss from Company Operations in Year 0, No Inflation and a Discount Rate of 5% (£000s)

	Year							PV
	0	1	2	3	4	5	6	
Project X Cash Flows								
Initial investment	-100.0							-100.0
Operating cash flows		+40.0	+40.0	+40.0	+40.0	+40.0		173.2
Tax benefits of capital allowance			+52.0*					47.2
Tax on operating cash flows			-20.8	-20.8	-20.8	-20.8	-20.8	-85.8
Tax effect on stock relief			-3.1	-3.1	-3.1	-3.1	-3.1	-12.8
Total cash flows of project X	-100.0	+40.0	+68.1	+16.1	+16.1	+16.1	-23.9	+21.8
Project Y's Additional Cash Flows								
Investment in stock	-30.0					+30.0		-6.5
Investment in other working capital	-10.0					+10.0		-2.2
Extra tax effect of stock relief			+15.6*				-15.6	+2.5
Total cash flows of project Y	-140.0	+40.0	+83.7	+16.1	+16.1	+56.1	-39.5	+15.6

*These cash flows occur a year later than in Table 1 because the company has a tax loss in year 0.

and project Y assuming no inflation and a discount rate of 5%. A comparison with Table 1 shows that the beneficial effects of the initial capital investment on the stock relief calculation have effectively been lost for ever. Stock relief decreases the NPV of project X by £12,800 and the NPV of project Y by £10,300. It is clearly possible for stock relief to convert a marginally attractive project into an unattractive one. (For example this would have happened to project X in Table 3 if the initial capital investment had only been £60,000, or if the operating cash flows had only been £25,000 p.a.)

A company may elect not to claim a first year allowance or may choose the allowance to be reduced to an amount it specifies. If we assume as before that the asset has zero residual value at the end of 5 years, the unclaimed allowance (except in the case of new ships) is then in effect written off against taxes on a 25% p.a. declining balance basis. It is clearly worth calculating whether this provision makes projects X and Y more attractive than is indicated by Table 3. One effect of not taking the whole of a 100% first year allowance is that some of the benefits of the tax allowances on the capital equipment are received later than they would otherwise be and are therefore worth less in present value terms. However, for a company in a temporary non-tax paying position this disadvantage must be weighed against the advantage that the beneficial effects of the initial investment on the stock relief calculation are not completely lost for ever.

Consider again the company in Table 3. For

the sake of generality assume a discount rate of r and a tax rate of T . If the company elects not to take an amount A of its first year capital allowance, it foregoes a tax inflow of TA in year 2 which has a present value of:

$$\frac{TA}{(1+r)^2}$$

Instead the company obtains tax allowances in years 1, 2, 3, ... of $0.25A$, $0.25 \times 0.75A$, $0.25 \times (0.75)^2A$... The cash flows from these tax allowances have a present value of:

$$\frac{0.25TA}{(1+r)^2} + \frac{0.25 \times 0.75TA}{(1+r)^3} + \frac{0.25 \times (0.75)^2TA}{(1+r)^4} + \dots$$

which can be shown to equal

$$\frac{0.25TA}{(1+r)(0.25+r)}$$

The favourable impact of the capital allowances on the stock relief calculation increases these benefits by 15%. Not taking the first year capital allowance is therefore worthwhile if

$$\frac{1.15 \times 0.25TA}{(1+r)(0.25+r)} > \frac{TA}{(1+r)^2}$$

which reduces to

$$r < 0.053$$

In other words, if the discount rate is less than 5.3% a company which has a tax loss in year 0

but expects to be paying tax in subsequent years should not take any of the 100% first year allowance on assets purchased in year 0. If the discount rate is greater than 5.3% the whole of the first year capital allowance should be taken.

Leasing

Financial lease evaluations normally take account of the fact that if a company borrows money to buy an asset it obtains the benefits of the first year capital allowance whereas, if it leases, these are realised by the lessor. Strictly speaking the effect of first year allowances on the stock relief calculation should also be considered. If the company is not in a tax paying position at the time the asset is acquired there is no effect. If the company is in a tax paying position the benefits of the first year capital allowance are increased by 15%.

Leasing tends to be the most attractive financing alternative for a company which is not in a tax paying position and borrowing tends to be the most attractive alternative for a company which is in a tax paying position. The effect of stock relief is to reinforce the second of these two observations.

Summary and conclusions

Stock relief was originally introduced to counter the tax effects of inflation on a company's investment in stock. However, in capital investment appraisal these 'inflation-related' effects of stock relief may not be as large as its other effects. Any new capital investment is liable to affect both a company's relevant income and its stock level. If the company is in a tax paying position the effect of stock relief can be to reduce the attractiveness of a viable investment (and, indeed, this will always be the case in situations where the investment requires no additional stock to be held by the company). If the company is in a temporary non-tax paying position the way in which relevant income is calculated can lead to stock relief having a quite large adverse effect on the attractiveness of an investment (and even converting an otherwise attractive investment into an unattractive one).

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A New Approach to the Levels of Assurance Issue in Auditing*

John Y. Lee

'Given our present state of knowledge, realizing the goal of specifying degrees of credibility in audit opinions seems well-nigh impossible. But then the history of mankind has been one of realizing the impossible.'

Report of the Committee on Basic Auditing Concepts (p. 42)

The auditor's responsibility in an audit is to collect evidence and evaluate it to satisfy himself as to the reliability of financial statements before he expresses an opinion on them. The term audit satisfaction has been understood to mean that the reliability which the auditor assesses should be higher than a 'reasonable level' for a warranted assertion. Based on this unspecified 'reasonable level' of reliability, the reliabilities required from substantive tests are derived by the auditor.

The difficulty of measuring the degree of credibility auditors intend to communicate for different audit opinions was expressed by the Committee on Basic Auditing Concepts of the American Accounting Association (1969-71) as follows:

What is the degree of credibility necessary for an unqualified audit opinion? ... We conclude from auditing literature that the typical unqualified opinion implies a very high degree of credibility. But it is difficult to know just what degree of credibility auditors intend to communicate with qualifications and other modifications of opinions (The Committee Report, p. 41).

After a review of auditing literature, the Committee stated that it 'believes that the auditing profession should direct its research effort toward specifying some degree of credibility in pro-

fessional opinions' (p. 41). Since the publication of this report, however, there has been very little published research on the specification of degrees of credibility per se. In particular, there has been no attempt to construct a framework for the auditor's specification of levels of assurance, which is believed to be the first step toward achieving the goal to specify degree of credibility in auditors' opinions. The purpose of this paper is to describe observed auditor 'action' within a theoretical framework which he goes through to arrive at the final audit opinion. An effort is made to identify individual problems related to each phase of the auditor's decision making and to indicate specific difficulties in the determination of the values required for specifying levels of assurance.

Degrees of assurance

To justify an assertion of a proposition, that assertion should be proved to be true. When an assertion is made by a professional, the assertion is warranted. When the professional warrants an assertion, he must have formed a belief to support the warranted assertion and this is generally termed assurance. This warranted assertion is distinguished from positive knowledge because of its lack of absolute certainty. The degree of certainty ranges from certain truth to certain falsehood. The Committee Report employed Russell's description to state these varying degrees of assurance:

Russell refers to these varying degrees of conviction as degrees of credibility—the probability that a given assertion is true or valid ... Ideally, an investigator should not express his belief concerning a proposition without expressing the degree of credibility attached to the proposition being judged (p. 41).

Thus, auditors assign some degree of credibility to the belief formed on each proposition under con-

*The author gratefully acknowledges the financial support of Exxon Company for this study.

sideration. An auditor will then assess the weight to be given to each proposition based on the importance of the amount involved, the effect on other accounts, and so forth. This process involves materiality decision. The weight is symbolised as w_i which can be scaled to meet the conditions:

$$0 < w_i < 1, \text{ and } \sum_{i=1}^n w_i = 1$$

where

n = number of propositions in the financial statements and records.

Then the total level of assurance, T , for all the propositions, p_i s, will be

$$T = \prod_{i=1}^n w_i r_i \text{ and } 0 \leq T \leq 1 \quad (1)$$

where r_i represents the degree of credibility for each proposition p_i subject to $0 \leq r_i \leq 1$. The weight used for a proposition such as accounts receivable which represents sales and collection cycle would be much greater than that for a proposition such as accrued property taxes in a typical audit.

The weight assigning process in auditing literature is treated as the materiality decision process. The basic purpose of treating materiality as a quantitative rather than qualitative concept in this paper is to pave the way to obtaining a single value or a range of values for the overall level of assurance in an audit. Although previous materiality research has been influenced by the assumption of viewing materiality as a nominal concept, an approach viewing materiality as an ordinal variable has been made (Moriarty and Barron, 1976).

The multiplicative relationship is assumed here for the aggregation of weighted reliabilities, while the true form of this relationship is to be studied in the future. It is not contended that the multiplicative model is correct. However, it appears that many practising CPAs and academicians prefer a multiplicative model to an additive one. Throughout the discussion in this paper, it is also assumed that an auditor is prudent, i.e., he is competent and has integrity. Without this assumption, the value of T cannot be used as the level of assurance of the opinion presented in the auditor's report, because there would be the belief-attitude two-way interaction problem frequently encountered in human behaviour studies. The attitude he takes after he has formed a belief should be free from bias. If an auditor's ethics are in doubt and there is a possibility of a heavy bias, then the

attitude (decision) does not reflect the belief (weighted reliabilities), and the auditor would try to convince himself erroneously that the untrue value of T value affects the true $w_i r_i$'s, reflecting reliabilities ($w_i r_i$ s), that is, incorrect T value affects the true $w_i r_i$ s, reflecting two-way interaction.

r_i For Each Proposition

The degree of credibility for a proposition, r_i , is composed of three complex elements: (1) the degree of credibility for each account or area of the system of internal control, (2) the subjective judgment and/or the statistical inference made from the substantive tests, and (3) the effect of interconnected propositions on this proposition. Initially, let us indicate the relationship of the first two elements, excluding the third element for clarity. Then the above will be expressed in a functional form

$$r_i = f(c_i, s_i) \text{ for } i = 1, \dots, n \quad (2)$$

$$0 \leq c_i \leq 1 \text{ and } 0 \leq s_i \leq 1$$

where

c_i = the degree of credibility resulting from internal control evaluation

s_i = substantive test results.

If the system review and the compliance tests of internal control reveal an extremely high degree of credibility, that is if c_i is almost equal to 1, then the substantive test could be set at a low level, and the auditor would still have a high degree of credibility for the proposition under consideration, assuming that the other audited accounts do not indicate an effect of the above third element and that there is no management override producing unanticipated errors which might have passed through the system undetected.

If the third element, denoted as γ_i , is introduced in equation (2), we have

$$r_i = f(c_i, s_i) + \lambda \gamma_i \quad (3)$$

where

$$\lambda = \text{parameter for } \gamma_i$$

and

$$\gamma_i = g(c_1, \dots, c_n, s_1, \dots, s_n)$$

γ_i is a function of all the relevant c_i s and s_i s. For example, γ_2 may be influenced by c_1 , c_5 , s_1 , and s_5 . That is, the degree of credibility of a belief concerning 'the allowance for uncollectible accounts' should be affected by the internal control evaluation and substantive tests concerning

propositions related to past sales and receivables collection. By definition, $\lambda\gamma_i$ may take a negative value. That is, if c_1 , c_5 , s_1 , and s_5 all have a very low value, then r_2 should be at a lower degree than it would otherwise be for determined values of c_2 and s_2 .

Weight (w_i)

The weight, w_i , in the framework may take either ordinal values as has been used in previous materiality research or other types of quantitative terms. If auditors could express their materiality judgments in ordinal scales (Moriarty and Barron, 1976), they would be able to use percentage terms which have the same type of range, 0 to 100%, as the ordinal scales, say, 1 to 7.

The criteria to be used in determining the weight may be established based on the industry the client company belongs to, the size of the company, the particular nature of the company operations, historical probabilities of irregularities, and so forth. Experienced auditors seem to have their own established standards for this, and, once established, the criteria for each firm may be used in subsequent years subject to possible revisions in every auditing period.

Specification for elements

Measuring c_i

The audit process begins with the evaluation of the client's system of internal control. For each class of transactions and areas, an examination is made as to the types of the likely errors, and the existence of the control procedures which should prevent and detect these errors. Cushing (1974) defined the objective of examining internal control as the determination of the likelihood of specified types of errors being able to get through the system undetected. Moriarty (1975, p. 32) further described this as follows:

The auditor has learned, through experience, the types of errors which can be expected. The auditor also has learned that specific controls can be instituted to detect and correct these errors. Thus, if one auditor notices that a specific control is missing in the client's system, the auditor concludes that there is a positive probability that an anticipated type of error may exist, uncorrected, in the client's statements.

The next step is to test whether the prescribed procedures were applied properly by appropriate

personnel. The results of this compliance test are used in determining the nature and extent of substantive tests. Especially for those areas with weak controls and compliance, expanded tests will be performed to detect the 'anticipated type of errors'. Tests of compliance are not necessary if the control procedures are not to be relied upon to determine the extent of substantive tests in the case where audit effort required to test compliance with the procedures to justify reliance on them in making substantive tests would exceed the reduction in effort that could be achieved by such reliance (SAS No. 1, p. 28). In practice, the same sample may be taken for dual-purpose tests: compliance tests and substantive tests.

Subjective evaluation for tests of compliance is possible. However, quantitative evaluation based on statistical sampling should be more useful in determining sample size and in evaluating sample results (SAS No. 1, p. 30). Because of its very nature, the degree of compliance, b_i , cannot exceed 100%. Consequently, the c_i degree of credibility for internal control cannot exceed the reliability (Z_i) assigned for the evaluation of the specific system. That is,

$$c_i \leq Z_i$$

where

$$c_i = b_i Z_i \quad (5)$$

and

$$0 < b_i \leq 1$$

It is noted that one instance of noncompliance may totally destroy all reliability. For instance, if the amount in the sales invoice does not agree with the corresponding sales journal entry, favourable results found on other attributes in the client's billing function (such as that the quantity on the bill of lading agrees with the duplicate sales invoice or that the quantity on the sales order agrees with the duplicate sales invoice) may be meaningless.

Recently, there have been some notable contributions to the measurement of Z_i s, the reliability of internal control systems. Yu and Neter (1973) used a stochastic model for this, Cushing (1974, 1975) and Bodnar (1975) have employed reliability theory for mathematical analysis and design of internal control system evaluation, and Kinney (1975) has explored the decision theory aspects of internal control system design, compliance and substantive tests. Kinney's discussion, however, is based on the assumption that the auditor can express his knowledge on the internal control evaluation and compliance assessments in the form of a probability distribution over the

two decision-relevant states: true state and state with errors. The approaches of Yu and Neter, and Cushing, suggest the feasibility of measuring the reliability of internal control in mathematical probabilities. Yet the applicability of these techniques to actual fields of auditing is to be tested in a setting where the numerous assumptions they made are relaxed. Bayesian statistics could be used to express the qualitative evidence on the internal control in quantitative terms by assessing subjective probabilities of the auditors. The successful application of the Bayesian approach in auditing depends upon two elements: to find appropriate means to measure subjective probability distributions, and the training of auditors in statistics and probability to a fairly high degree of sophistication (Lee, 1979).

s_i

Substantive tests are necessary to reduce the risk that any material errors will exist in the financial statements undetected by internal control and the auditor's examination. To ascertain that the risk is at a reasonably low level, the auditor tests transactions and/or account balances based on subjective judgments or using statistical sampling. Of course, evaluation of the sampling results is made as to both precision of the range of values and reliability (confidence level) based on the auditor's judgment. Precision is closely tied to materiality discussion. The reliability level of substantive tests varies inversely with that of internal control measured by the auditor. Statement on Auditing Standards No. 1 (p. 53) gives a formula for the reliability level for substantive tests developed from established probability theorems:

$$S = 1 - \frac{1 - R}{1 - C} \quad (6)$$

where

S = reliability level for substantive tests
 R = combined reliability level desired
 C = reliance assigned to internal accounting control and other relevant factors.

By transforming the above equation we get

$$R = C + S - CS, \quad (7)$$

or

$$R = C + (1 - C)S \quad (8)$$

The combined reliability level, R (T in the framework of this paper) is determined by the auditor considering the 'reasonable' level of assurance he

needs for the 'audit satisfaction.' By changing Equation (6) to Equation (8) to suit our framework, we can recognise that the AICPA has adopted an additive model for the aggregation of the levels of reliability for related elements. SAS No. 1 (p. 34) also suggests that the relative weight to be given to the respective sources of reliance (internal control, tests of details and other auditing procedures) are matters for the auditor's judgment in the circumstances. Now a question comes up after a second look at Equation (8). There are two additive components in the equation: C and $(1 - C)S$. According to the SAS formula, the results of substantive tests do not have any adverse effect on C , the reliability assessed from internal control, and the substantive tests will only increase or, at least, not change the reliability R because S is multiplied by the complement of C . If as the objective of substantive tests we are looking for unanticipated errors, where unanticipated includes errors which the auditor mistakenly believed would be detected by a specific control in the internal control system, or irregularities arising from management override of internal control, the discovery of this type of error should negatively influence the first component, C .

Therefore, in applying this formula, auditors should be cautioned as to the concepts originally intended, presumably, by the AICPA. The extent of substantive tests is initially determined based on the originally evaluated C and resulting S . Based on the results of substantive tests, however, C is adjusted multiple times and the extent of substantive tests is expanded.

Conclusions

In this paper, the author has attempted to describe observed auditor 'action' within a theoretical framework assuming that a technique for decomposing financial statements into elementary propositions is available. A single comprehensive formula for the aggregation of degrees of credibility assessed for all the propositions and functional areas cannot be specified because of the limitations listed above and the difficulties in measuring $\lambda\gamma_i$ of Equation (3). To deal with the question of whether the model which the auditor uses is more complex than the one presented here, psychological measurement theories should be useful although a comprehensive mathematical or probabilistic model development would seem to be a difficult task in the near future.

The accounting profession has spent a tremen-

dous amount of time and effort on the issue of materiality which is a matter of precision closely related to reliability in the audit evidence evaluation. The only standard for the appropriate level of assurance mentioned in auditing literature is 'reasonable basis' or 'reasonable level'. The materiality discussion should become more fruitful if combined with the reliability or assurance consideration. A new approach taken in this paper to the materiality and assurance issue may be a viable alternative to the current approaches which do not consider the relationship between the materiality and assurance of individual propositions and the overall level of assurance of the financial statements taken as a whole.

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Taxation and Corporate Finance and Investment*

Graeme Macdonald

This paper analyses the pressures of the UK tax system on corporate finance and investment policy and concludes that, because the tax burden can differ according to the source of finance, the cost of capital is partially dependent upon the type of finance available. In order to highlight the effects of the tax structure we abstract from the real world. In particular we consider a world of perfect certainty with a perfect capital market in which there are no transaction costs. In such a world it is assumed that individuals seek to maximise utility by preferring more rather than less wealth and that companies seek to optimise by maximising shareholder wealth. Whether or not this approach constrains application of the analysis to the real world is considered in the conclusion.

We begin by identifying the main tax variables experienced recently in the UK which may combine to influence corporate finance and investment decisions. In doing so we consider total tax systems: not only the corporate but the personal tax rate structures are taken into account, while alternative tax bases involving possible provisions as to deductibility of interest and allowance for depreciation are also recognised. It is assumed that the actual as well as the formal incidence of the corporation tax is on the company, and thus, effectively, on the investors in the company.

Optimal finance policy is considered in two stages: the first is concerned with cases in which retained profits are available as an alternative source of finance to external finance, and here particular attention is paid to the problems of valuing retentions under each different tax system. The second stage looks at external finance as the sole option and, in that context, examines optimal dividend policy. The form of the analysis is to establish for each pair of finance policy options an indifference equation to show for each tax base the condition, in terms of tax rates, under which

investors would be indifferent as to which policy was adopted. From these equations we then establish a financial cost of capital. Finally the conclusions as to optimal finance policy are summarised in a study of the corporate cost of capital, where we see that because of the distortions created by taxation the latter is a function not just of the market rate of interest but also of optimal finance policy.

The tax variables

Within any tax system, we may identify three structural elements: the tax base, the tax rate and the tax unit. For our purposes we are concerned with the combined effect of both corporate and personal taxes on an individual's wealth. The effective tax unit discussed here is therefore the individual, although formally both the individual and the company are tax units.

The rate structure of both taxes is important to our analysis in the sense not of absolute rates but of co-existing differential rates. Throughout we shall assume that all tax rates are constant over time. At the personal level there is discrimination through the tax rates between income realised through dividends or interest and income realised as a capital gain; the first being taxed at a marginal rate m^1 and the latter at a marginal rate g , usually lower than m .² In practice there is also a difference in the timing of the tax payments in that income tax is usually deducted, in part at least, at source, whereas capital gains tax is charged only on realisation so that the effective

¹The marginal rate m is here taken as being the average rate of income tax applicable to the marginal dividend or interest payment under consideration by the company. This will not be equal to the nominal marginal tax rate where the possible payment to a shareholder would embrace more than one marginal income tax rate.

²The rate structure for the capital gains tax introduced by the Finance Act 1978 s. 44 meant that certain nil rate income tax payers face a higher rate on capital gains, or that income tax payers with a marginal rate of less than 50% faced a capital gains tax rate over a short band of 50%. Such special cases are ignored in this paper.

*The author acknowledges the helpful comments of Professors Peter Bird and Michael Bromwich, John Glynn and Professor Mervyn King on earlier drafts of this article.

marginal rate may be significantly less than the nominal rate g . For the purpose of this paper we shall assume that the capital gains tax is charged on an accruals rather than a realisation basis, and that all taxes are paid when income arises.

At the corporate level the rate structure may explicitly discriminate by taxing distributed income at a marginal rate c_d and undistributed income at a different rate c_u . Such is the two rate system and, implicitly, the imputation system,³ whereas the classical system taxes all income at the same rate. Hereafter we will generalise and apply the rates c_d and c_u to the respective classes of taxable income regardless of the system under discussion; for the classical system it will be sufficient to note that c_d equals c_u . Where the class of income is not specified a general term c will represent the tax rate.

Also significant at the corporate level is the definition or measurement of the tax base. Here, too, discrimination as between different methods of finance may be introduced. Nominally the tax base is corporate income but interest may be allowed as a deduction in computing taxable income. Assuming, as we shall do throughout, that interest must be paid out and cannot be retained,⁴ then such an allowance means that the return on investment financed by debt will always be distributed but will be effectively zero rated for corporation tax purposes.

Second, taxable income may be measured either as cash inflows less economic depreciation, or as cash inflows less some additional allowance for depreciation. Economic depreciation is a deduction from cash inflows made in computing income as a stream of interest. Thus a one period investment undertaken at t_0 costing I_0 may produce cash inflows at t_1 of C_1 . The value of the investment at t_0 (V_0) will be $C_1/(1+r)$, where r is the market rate of interest. Then income for the period $t_0 - t_1$, ($Y_{t_0-t_1}$) may be measured as $C_1 - (V_0 - V_1)$ where $(V_0 - V_1)$ is the change in the value of the investment over the period and the measure of economic depreciation. In the one period investment case, V_1 equals zero so that:

$$Y_{t_0-t_1} = C_1 - V_0 = C_1 - \frac{C_1}{1+r} = r(V_0) \quad (1)$$

³For the UK imputation system c_u is given by the nominal corporation tax rate, and c_d by $1 - \left[\frac{1-c_u}{1-s} \right]$ where s is the basic rate of income tax.

⁴In the context of a world of perfect certainty this is taken to be the only difference between debt and equity capital. In the absence of taxes the return to saving would be the same whether it be in the form of debt or equity.

In equilibrium, hereafter assumed, I_0 will equal V_0 so that income (after allowing for economic depreciation) may be expressed as the market rate of return on investment. Thus a unit of investment may be said to generate income of r which, assuming that the tax base allows only economic depreciation, will also be taxable income. The after corporation tax return to a unit of investment would thus be $r(1-c)$.

Alternatively the tax base may be cash flow less some additional depreciation allowance. We shall assume throughout this paper that such allowances are 100% first year allowances (which if not set off against taxable cash flows may be carried forward at their nominal value).

These allowances are only effective as deductions against taxable income already earned, so that they are only immediately beneficial in respect of investment financed by undistributed taxable income or external finance up to the level of distributed taxable income.⁵ The effect of the allowances is to zero rate the return on the saving associated with the investment so that the after tax rate of return is r as compared with $r(1-c)$ if only economic depreciation is available. Again a one period example will make this clear. A company retains a unit of taxable income after tax of $(1-c_u)$; given 100% first year allowances this will allow a single period investment of:

$$(1-c_u) \times \frac{1}{(1-c_u)} = 1 \quad (2)$$

The tax allowances of c_u on this investment cancel the tax payable, c_u , on the taxable income already earned. At a rate of return r on the investment there will be net cash inflows at the end of the period of $(1+r)$ subject to tax (economic depreciation not being given in addition to first year allowances). If only the return on the new investment is distributed, this, net of tax on distributed cash and after first year allowances on cash retained and reinvested, will reduce to $r(1-c_d)$. The amount originally saved was the amount of consumption forgone by the shareholders, $(1-c_d)$.⁶ The rate of return on that saving is thus

⁵Much of the literature ignores this aspect of investment incentives by assuming perfect loss relief. This implies either immediate tax repayment regardless of tax currently or previously paid, or carry forward of losses at a level increased by the rate of interest which, in equilibrium and certainty, would equal the rate of return to production.

⁶This point would seem to have been overlooked in the report of the Meade Committee (see Pages 64-66) where the post-tax return to the saver was measured by reference to the saving at company level rather than the dividend net of personal tax forgone by the saver.

Table 1
Corporate tax bases

<i>Tax Base</i>	<i>A</i> <i>Interest</i> <i>Allowed</i>	<i>D</i> <i>Interest</i> <i>Disallowed</i>
E Economic depreciation	AE	DE
F 100% 1st Year allowances	AF	DF

the pre-corporation tax rate of return to production, r . Similarly if the total net cash inflow is distributed and the investment not renewed this will reduce to $(1 + r)(1 - c_d)$ net of tax, giving a return to saving of $[(1 + r)(1 - c_d) - (1 - c_d)]$, that is, $r(1 - c_d)$.

Thus, depending on the interest relief and depreciation allowance provisions, certain returns to investment and saving may be effectively exempted from corporation tax. In discussing any particular finance policy or investment decision the tax base must therefore be clearly defined. For our purposes we will distinguish between those bases which, at the one extreme, allow only economic depreciation (E) and those which at the other allow 100% first year allowances (F); and will further divide each of these bases into those which allow the deduction of interest (A) and those which do not (D). Tax bases will be labelled as in Table 1, and where identification is by one letter only this will be taken to include both the alternative versions of that base. Unless otherwise stated the depreciation base will be taken as being applicable to all investment.

Incidence

In any analysis of the effects of corporation tax on finance policy some assumption must be made as to the incidence of the tax. Consider an economy where r is the rate of return to investment and saving in perpetuity and there is no corporation tax. Personal income tax may be ignored at this stage on the assumption that there is only an income tax and no differential capital gains tax: it makes no difference to the valuation of a unit of investment which may be valued as a perpetuity either at:

$$\frac{r}{r} \text{ or } \frac{r(1 - m)}{r(1 - m)} = 1 \quad (3)$$

Now let a base DE corporation tax be introduced with the opportunity of earning a return at the rate r outside the corporate sector remaining: then, depending on the incidence of the tax, the value of a unit of investment in the corporate

sector may be reduced. Assuming that the actual and formal incidences of the corporation tax are the same, that is that the tax is borne by the company (and thence the investors), then the rate of return to investment will be reduced to $r(1 - c)$. As Stiglitz (1973) and King (1975) have shown, on the introduction of a corporation tax the effective incidence is a lump sum tax on the existing shareholders manifest in the fall in value of their shares. Thus a unit of investment is valued after the introduction of the tax as:

$$r(1 - c) \times \frac{1}{r} = (1 - c) \quad (4)$$

that is, it is immediately reduced in value by a factor of $(1 - c)$.⁷ The shareholders effectively suffer no further tax although the formal incidence, given our present assumption, remains on the company which pays tax periodically. Thus on periodic returns of r the company will continue to pay tax of rc with shareholders receiving returns of $r(1 - c)$ on shares now valued at $(1 - c)$: a return equal to that available outside the corporate sector.

Alternatively we may assume the other incidence extreme: that the tax is fully shifted through, for example, a rise in output prices. The rate of return on investment would thus increase to $r/(1 - c)$ before tax so that a unit of saving will retain its pre-corporation tax regime value of:

$$r \frac{(1 - c)}{(1 - c)} \times \frac{1}{r} = 1 \quad (5)$$

Now this would also be the value of a unit of investment financed wholly by debt at interest rate r under a corporation tax levied on base AE: under this base the return r on a unit of investment would be matched by the interest payable on the debt financing the investment, leaving taxable income at zero. A unit of debt would itself be valued at 1 as per equation (3). We may note therefore that the whole discussion of debt finance

⁷The fall in value applies whether the depreciation policy operative is economic depreciation or first year allowances since the latter would apply only to investment after the introduction of the tax. This would suggest that companies should be liquidated on announcement of the tax. That this does not always happen may be owing to the costs associated with liquidation (particularly those incurred in the break up of large scale physical capital which the corporation makes possible) which result in a break up value of the company less than the after tax value of a going concern. Alternatively, some companies may be retained because, as this paper seeks to show, there remain tax advantages to companies even with a corporation tax. We could also posit a tax under which the government protected itself from such wholesale avoidance by legislating that return of pre-corporation tax capital would be charged to corporation tax.

and its associated tax advantages under the AE systems is founded on the assumption that the actual incidence of the corporation tax is on the company, for if the incidence were shifted there would be no need also to avoid the tax through the use of debt finance. Similarly we could argue that less than 100% debt structures may be accounted for by some partial shifting of the tax.

Consider now the introduction of a differential capital gains tax while retaining the assumption of shifting under a DE base: then any incentive to retain rather than distribute income becomes purely a function of the personal tax system and the differential between m and g .⁸ However, if the tax is not shifted so that the pre-tax rate of return on investment remains at r , then the value of a unit of reinvested income will, following equation (4), be not 1 but $(1 - c)$. In this case any discrimination between retention and distribution is now a function of both corporate and personal taxes; and, since it is in the interplay of both taxes that we are particularly interested, we will hereafter assume that the corporate tax is borne by the company.⁹

Optimal finance policy and internal finance

We may now analyse the optimal finance policy for a company given the alternative tax bases. In so doing we will assume that the company is faced with a given investment opportunity to which it is committed and which will generate returns before tax at the rate r in perpetuity; which rate is also the rate of return to investment and saving ruling throughout the economy. It is also expected that the returns from the investment will be distributed. It is further assumed that the company is wholly financed by equity capital, and was incorporated prior to the introduction of a corporation tax or a differential capital gains tax.

The alternative sources of finance available to the company may include equity capital, debt capital and retained income. The first stage in the analysis is to assume that there is income available for retention. The company then potentially faces a choice between:

- (a) retaining income, and

- (b) distributing income and raising either debt or equity capital.

Under category D tax bases there is no distinction for tax purposes between debt and equity so that the decision collapses into a single decision as between (i) retention and (ii) distribution with a new issue. A unit of retained income will be expressed as $(1 - c_u)$ and a unit of distributed income as $(1 - c_d)$. Critical to ascertaining the point of indifference is the value of the after corporation tax dividend stream generated by the new project; and it is here that the distinction between the tax bases DE and DF is important.

With base DE a unit of investment is, following equation (4), valued by a reduction factor of $(1 - c_d)$ so that retained income of $(1 - c_u)$ will represent a gain net of capital gains tax to the investor of:

$$(1 - c_u)(1 - c_d)(1 - g) \quad (6)$$

Similarly a capital issue of $(1 - c_u)$ would also be reduced in value to $(1 - c_u)(1 - c_d)$, giving an investor a loss after capital gains tax relief of:

$$c_d(1 - c_u)(1 - g) \quad (7)$$

Investors would therefore be indifferent between the alternatives where the net gain (6) equals the alternative dividend after income tax less the loss on the subsequent new investment.¹⁰ That is, where:

$$\begin{aligned} (1 - c_u)(1 - c_d)(1 - g) \\ = (1 - c_d)(1 - m) - c_d(1 - c_u)(1 - g) \end{aligned} \quad (8)$$

which simplifies to:

$$\frac{(1 - c_u)}{(1 - c_d)}(1 - g) = (1 - m) \quad (9)$$

By contrast when base DF is operative this loss in value of the retained income and equity issue does not arise. An after tax unit of retention of $(1 - c_u)$ will, from equation (2), generate investment of 1 which in turn will produce a dividend stream of $r(1 - c_d)$ valued after capital gains tax as:

$$(1 - c_d)(1 - g) \quad (10)$$

However, if the unit of taxable income is distributed rather than retained, then only tax of c_d will have been paid so that a new issue of only

⁸Assuming, as we do hereafter, that there is no additional utility to be derived by the investor from one form of income as opposed to the other.

⁹We assume that the tax is suffered at the nominal rate, but anything less than 100% shifting would involve a positive effective corporate tax rate and the general analysis applies equally to that situation.

¹⁰Clearly this does not represent an optimal investment policy, but we return to this below. The finance policy described here would imply a stock dividend taxed as such under FA (No. 2) 1975 s.34.

$(1 - c_d)$ will be needed¹¹ to generate investment of:

$$(1 - c_d) \times \frac{1}{(1 - c_d)} = 1 \quad (11)$$

and a dividend stream of $r(1 - c_d)$. Since this represents a return at the market rate there will be no loss on the issue so that indifference will occur where:

$$(1 - c_d)(1 - g) = (1 - c_d)(1 - m) \quad (12)$$

which is where:

$$(1 - g) = (1 - m) \quad (13)$$

Under category A tax bases, where interest relief is given, the choice between retention and distribution with equity issue will clearly be exactly for bases AE and AF as it was for bases DE and DF respectively. The choice still to be analysed is that between retentions and distribution with a subsequent debt issue. The value of retentions will in each case be as under expressions (6) and (10). We assume that debt earns interest at the rate r so that under the AE base there will be no capital loss on the issue of debt as there was in the case of an equity issue. Therefore, for an AE base, indifference will arise where:

$$(1 - c_u)(1 - c_d)(1 - g) = (1 - c_d)(1 - m) \quad (14)$$

simplifying to:

$$(1 - c_u)(1 - g) = (1 - m) \quad (15)$$

Tax base AF, however, gives rise to a condition not previously experienced in this discussion: that the combination of 100% first year allowances with interest deductibility gives a return to saving which is in excess of the return to investment. This phenomenon has been noted by both King (1975) and Meade (1978), but, in the absence of perfect loss offsets, this result can only¹² be

¹¹The mechanics of this under the imputation system are that out of $(1 - c_d)$ only $(1 - c_u)$ is invested, and this attracts tax relief at the nominal rate c_u so as to produce gross investment of $(1 - c_u) \times \frac{1}{(1 - c_u)} = 1$. The balance of the issue, $(c_u - c_d)$, is unrelieved ACT which is the personal tax at basic rate paid on behalf of the investor by the company.

¹²If there were a class of asset which did not attract first year allowances then it is conceivable that a company could, as a total policy, (i) retain income and invest in non-allowable assets and (ii) borrow and invest an amount equal to retained income in allowable assets. Such a policy would be valued as follows:

(i) invest one unit of income $(1 - c_u)$ in a non-allowable asset earning at the rate r before tax to give a net capital gain of

obtained under the particular finance policy now being considered, one which requires some equity capital. This is so because first year allowances need taxable income to be of any benefit, but with a 100% debt structure and interest deductibility there would be no taxable income. A constraint, not noted by those authors but which we shall hold as binding, is that under UK tax legislation¹³ interest payments in excess of the market rate of interest are treated as dividends and not interest. Thus only with an initial equity capital generating taxable income, which is distributed and borrowed back at the market rate of interest, can advantage be taken of this distortion.

The company having distributed and borrowed back an amount $(1 - c_d)$ will, as in equation (11), have an investment after first year allowances of 1. This will give rise to a net additional dividend stream of:

$$[r - r(1 - c_d)][1 - c_d] = rc_d(1 - c_d) \quad (16)$$

and thus, valuing this as a perpetuity, a gain net of gains tax to existing equity shareholders of:

$$c_d(1 - c_d)(1 - g) \quad (17)$$

These shareholders will therefore be indifferent between this policy and that of retention where the gain on retention (10) equals the distribution after personal tax plus the net gain as under (17); that is, where:

$$(1 - c_d)(1 - g) = (1 - c_d)(1 - m) + c_d(1 - c_d)(1 - g) \quad (18)$$

which simplifies to the condition that:

$$(1 - c_d)(1 - g) = (1 - m) \quad (19)$$

Before drawing conclusions from this analysis we must first relax the assumption that the company is committed to the project in question. Indifference between retaining income and distributing it and subsequently raising equity capital was shown to arise where:

$$(1 - c_u)(1 - c_d)(1 - g) = (1 - c_d)(1 - m) - c_d(1 - c_u)(1 - g) \quad (8)$$

under economic depreciation, and:

$$(1 - c_d)(1 - g) = (1 - c_d)(1 - m) \quad (12)$$

$(1 - c_u)(1 - c_d)(1 - g)$ net of all taxes (that is, exactly as for retentions under economic depreciation), plus
(ii) borrow $(1 - c_u)$ and invest in allowable assets to an investment of 1; this will give a return to equity after interest and corporation tax of $[r - r(1 - c_u)][1 - c_d]$ and thus a gain net of tax of $c_u(1 - c_d)(1 - g)$. The sum of these two is $(1 - c_d)(1 - g)$ which is the same as retaining income and investing in allowable assets.

¹³ICTA s.233 (2)(d)(iii).

under first year allowances. The essential difference between these conditions is that under (8) there is the lump sum tax effect in respect of both the retention and the new equity issue, while under (12) there is no such effect. By relaxing the assumption of commitment to the project, the alternative to retention in (8) becomes distribution without raising equity capital. In this way the original capital loss involved in the equity issue (7) would be avoided and shareholders' wealth maximised. Thus the condition for indifference under a DE base between retention (which involves reinvestment) and distribution (which excludes reinvestment) is that:

$$(1 - c_u)(1 - c_d)(1 - g) = (1 - c_d)(1 - m) \quad (20)$$

$$(1 - c_u)(1 - g) = (1 - m) \quad (21)$$

This of course is exactly the condition under which there would be indifference between retention and distribution with a debt issue under an AE base (15), since in that case there would also be no loss on the debt issue because of the interest relief. The significance of interest relief under the AE base is that it preserves neutrality between investment in the corporate sector and investment elsewhere. There is thus no necessity to assume that reinvestment, if any, following distribution takes place through the company; but we do require that if reinvestment is effected in the corporate sector it is financed through debt.

We may conclude, therefore, that under the E bases, indifference between retention and distribution arises where:

$$(1 - c_u)(1 - g) = (1 - m) \quad (15) \quad (21)$$

Under the DF base indifference arises where:

$$(1 - g) = (1 - m) \quad (13)$$

and under the AF base where:

$$(1 - c_d)(1 - g) = (1 - m) \quad (19)$$

the last condition requiring that reinvestment is through the corporate sector and is financed by a debt issue.

From the above analysis we can draw the following conclusions based, it must be emphasised, on our general assumptions as to the economic environment and on the particular assumption that income from investment financed by retentions will itself be distributed:

- (1) taxpayers with equal rates of m and g , a special case of which is the nil taxpayer, will never prefer retention to distribution although

under the DF base they will be indifferent between them. A company seeking to maximise the wealth of shareholders in this tax rate category should not therefore change its distribution policy in the face of a change from a classical to a discriminatory two rate corporation tax;

- (2) the move from a neutral to a discriminatory corporate tax rate structure, as made in the UK in 1973, is irrelevant to corporate distribution policy where a first year allowance system operates, as it did in the UK for a wide range of capital investment from 1972;

- (3) it will never be optimal to raise equity rather than debt, although under the D bases companies should be indifferent between both sources of finance: under the DE base neither type of finance should be raised, while under the DF base either source will be equally desirable;

- (4) given the A base for corporation tax, the debt-equity ratios of companies should depend in part on the preference for retentions relative to distribution plus borrowing. On a change from a classical to a two rate system, retentions will become more or less preferable as the relevant new rates are lower or higher respectively than the previous standard rate of the classical system. The relevant rates depend on the depreciation system in force, and are, for economic depreciation the retained rate, and for first year allowances the distributed rate. Thus whether the change in the UK corporate tax system has any effect on debt-equity ratios will depend in part on whether the investments of the company attract first year allowances or not.

External finance and distribution policy

From the analysis so far it is clear that the various forms of taxation do potentially affect finance policy in that there is discrimination between retained and distributed income, and between income arising from equity and income from debt capital. We would therefore expect companies to maximise shareholders' wealth by following a particular policy as to distribution and/or undertaking investment at a pre-tax rate of return different from that required by investors outside the corporate sector. That companies should so react assumes that they are aware of their shareholders' tax rates and/or that they pursue policies which will attract shareholders with the appropriate tax rate m . We therefore extend

our analysis to a consideration of distribution policy in general and its implications for raising equity capital.

The advantage of retentions over distributions arises from the differential between the rates g and m , with that advantage being offset under the E bases by corporation tax. It follows that the advantage (where it exists) must be maximised where the investor realises all his income in the form of a capital gain, which requires that all corporate income be retained. Expressions (15), (21), (13) and (19) therefore indicate the values of m at which indifference between full retention and full distribution arises. Where m is greater than these values then the company must pursue a policy of 100% retention in order to maximise shareholder wealth. If for some reason such an extreme retention policy is not feasible, then any level of retention will be preferable to none so long as m is greater than the values given by those expressions.

We consider now the raising of external finance for investment projects, given that retained income is not an available alternative. By examining the conditions under which new investors would be indifferent between an equity issue and a non-corporate investment, we cover both the A and D bases, since where an equity issue should be rejected this indicates the issue of debt under the A bases and non-corporate investment under the D bases. If the income from the equity issue is to be fully distributed, then, under both the E and F bases, new issues of equity should never be made because, given an issue of 1:

$$(1 - c_d)(1 - m) < (1 - m)^{14}$$

Therefore only if there is to be some retention can an equity issue be attractive. We may start by assuming the extreme policy of full retention. Under this policy, income for each period from a unit of investment would be $r(1 - c_u)$ which would be valued by the market at:

$$r(1 - c_u)(1 - c_d) \quad (22)$$

¹⁴Strictly, under the F basis, first year allowances would be carried forward so that distributed income up to the amount of the initial investment would be relieved from tax with the reinvestment of depreciation being covered by new first year allowances for that amount. Thus no corporation tax would be paid for n years where n equals $\frac{1}{r}$ so that the capital value

on the equity issue would only be reduced to $1 - \frac{c_d}{(1 + r)^n}$. However the same conclusions still follow. This reservation also applies to subsequent discussion of the F base.

under the E bases, and at:

$$r(1 - c_u) \times \frac{(1 - c_d)}{(1 - c_u)} = r(1 - c_d) \quad (23)$$

under the F bases. Thus with the opportunity of realising these gains in each period in perpetuity the value of the equity issue would fall from 1 to $(1 - c_d)(1 - c_u)$ under the E base, and to $(1 - c_d)$ under the F base. Investors will be indifferent to such equity issues where the present value of future gains less the present capital loss, both net of gains tax, is equal to the present value of income, less income tax, from a non-corporate investment. That is, where for the E bases:

$$[(1 - c_u)(1 - c_d) - [1 - (1 - c_u)(1 - c_d)]] \times (1 - g) = (1 - m) \quad (24)$$

simplifying to

$$[2(1 - c_u)(1 - c_d) - 1](1 - g) = (1 - m) \quad (25)$$

and for the F bases:

$$[(1 - c_d) - [1 - (1 - c_d)]](1 - g) = (1 - m) \quad (26)$$

simplifying to

$$[2(1 - c_d) - 1](1 - g) = (1 - m) \quad (27)$$

From expressions (25) and (27) we can calculate that the terms $(1 - c_u)(1 - c_d)$ and $(1 - c_d)$ respectively must be in the range 1 to 0.5, where m is in the range g to 1 and g is less than 1. Under the E bases, our tax rates have never satisfied the condition. Thus, we may conclude that, even with a policy of full retention, equity should never have been issued under a corporation tax regime. Under the F bases the condition may be satisfied, but equity issues with full retention will only become optimal for very high values of m and so attractive only to a very small minority of investors.

Of course full retention may not be considered feasible, so we should consider a more general approach by which we can establish, for a given value of m , what rate of retention, b , (with b in the range 0-1) is required to make a new equity issue equally attractive as a non-corporate investment. For this purpose we adopt a perpetual growth model whereby a company retains a proportion, b , (constant in perpetuity) of earnings. A share in such a company is valued, before taxes, as:

$$V_0 = \frac{D_1}{k - g^*} \quad (28)$$

where

V_0 = the value of the share at t_0 ,
 D_1 = the dividend expected at t_1 ,
 k = the cost of capital,
 g^* = the rate of growth.

A unit of investment will produce a dividend D_1 of $r(1-b)(1-c_d)$ and retentions of $rb(1-c_u)$. At time t_2 under an E base, the dividend (D_2) will have grown, assuming a continuing pre-tax rate of return r on reinvestment, to:

$$r(1-b)(1-c_d) + r(1-b)(1-c_d)[rb(1-c_u)] \quad (29)$$

$$= r(1-b)(1-c_d)[1 + rb(1-c_u)] \quad (30)$$

so that the rate of growth g^* will be $rb(1-c_u)$. Under an F base corporation tax D_2 will be:

$$r(1-b)(1-c_d) + r(1-b)(1-c_d) \times \left[rb(1-c_u) \times \frac{1}{(1-c_u)} \right] \quad (31)$$

$$= r(1-b)(1-c_d)(1+rb) \quad (32)$$

giving a rate of growth g^* of rb .

The value of these shares at t_0 is, assuming $k = r$, for E bases:

$$\frac{r(1-b)(1-c_d)}{r - rb(1-c_u)} \quad (33)$$

$$= \frac{(1-b)(1-c_d)}{1 - b(1-c_u)} \quad (34)$$

and for F bases:

$$\frac{r(1-b)(1-c_d)}{r - rb} \quad (35)$$

$$= (1-c_d) \quad (36)$$

We may note that under the F base the value of a new equity issue is constant regardless of the level of b . On the one hand, all dividends suffer tax at the rate c_d whenever paid while, on the other, retentions net of corporation tax earn after corporation tax the rate r , so that their value is the same as for a share on which all earnings are distributed and then reinvested by the investor elsewhere at the rate r .

Given the valuations in (34) and (36) we may now look at the investor's returns: assuming that he optimises by realising his capital gains, which will be g^*V_0 , his dividend stream will remain

constant at $r(1-b)(1-c_d)$.¹⁵ Under the E base his prospective income stream after personal taxes is thus:

$$r(1-b)(1-c_d)(1-m) + rb(1-c_u) \left[\frac{(1-b)(1-c_d)}{1-b(1-c_u)} \right] (1-g) \quad (37)$$

The capital loss net of gains tax relief on an issue of shares will, from expression (34), be:

$$\left[1 - \frac{(1-b)(1-c_d)}{1-b(1-c_u)} \right] (1-g) \quad (38)$$

By summing the perpetuity of expression (37) and expression (38) and setting the sum equal to $(1-m)$ we have, after simplifying, the condition for indifference:

$$\frac{b(1-c_u)(1-b)(1-c_d) + (1-b)(1-c_d) - [1-b(1-c_u)]}{[1-b(1-c_u)][1-(1-b)(1-c_d)]} \times (1-g) = (1-m) \quad (39)$$

Similarly under the F bases the prospective income stream is:

$$r(1-b)(1-c_d)(1-m) + rb(1-c_d)(1-g) \quad (40)$$

and the capital loss:

$$[1 - (1-c_d)](1-g) \quad (41)$$

Indifference then arises where, after simplifying:

$$\left[\frac{b(1-c_d) + (1-c_d) - 1}{1 - (1-b)(1-c_d)} \right] (1-g) = (1-m) \quad (42)$$

We have already seen that under the E bases, equity can never be optimal so expression (39) is inapplicable given our rates of g , c_u and c_d . However, under the F bases, given that the term $(1-c_d)$ is in the range 1 to 0.5, and given m , we can solve for b in order to establish the minimum rate of retention necessary to make a new equity issue at least viable if not optimal.

The cost of capital and equilibrium

Hitherto we have simply established the tax relationships which have to exist for investors to be indifferent between the options open. In so doing we have assumed both that the rate of return

¹⁵But if investors are concerned with long term realisation then we must recognise the effect of our limiting assumption that gains are taxed on an accruals basis. A reduced effective rate of g would lower the value of m at which full retention becomes optimal.

earned by the company is equal to the market rate, and that all market valuations are determined by reference to that market rate and without regard to differential personal taxes. If investors did face that marginal income tax rate necessary for indifference, then the assumptions above would be reasonable. However where the tax rates do not so accord then we may expect both market valuations and corporate investment policies to react to the distortions introduced by the tax system. Assuming that companies are earning the market rate of return and that corporate finance policies are given, then investors will trade in the capital market until their return net of personal taxes cannot be improved. New equilibrium share prices would thus be established and the clientele effect experienced. However, decreasing marginal returns to production suggest that we should not expect additional investment, however financed, to earn the original market rate of return r . In a world without tax, r would be the opportunity cost for investors investing in corporate productive opportunities, and companies would therefore not invest in projects earning a rate of return less than r . Further, the introduction of a single comprehensive tax on all returns to capital would not alter this decision rule. What does distort it is a corporation tax which taxes corporate as opposed to non-corporate returns to production, and a personal tax which discriminates between different forms of return. In this tax world, only where investors' marginal income tax rates are less than or equal to the rate necessary for indifference (given the rate of return r), will the decision rule not be violated. Otherwise companies will make their investment decisions by reference to a factor of r , that factor being determined by the tax rate variables applicable to both the company and the investor. Thus corporate investment will continue at decreasing rates of return until a new point of indifference is reached given investors' actual marginal tax rates and the lower rate of return.

Accordingly we will summarise the analysis in this paper by establishing for each option which is optimal¹⁶ for some value of m ,¹⁷ the company's required rate of return. This rate of return will be

¹⁶This therefore eliminates the issue of equity capital under the E base when retentions are also available, or when all returns are distributed. In this latter case the cost of capital would be $\frac{r}{(1 - c_d)}$.

¹⁷The value of m would have to be a mean marginal rate for shareholders in the company since we take the company to be the lowest divisible unit for investment. We assume that the clientele effect will already have been operative.

the company's financial cost of capital (k), and will be ascertained by reference to the governing relationship given by the indifference equations used above, and expressed as a factor of r . This summary is presented in Table 2.

The only expressions which need further explanation are those for debt finance, and these can only be relevant where the debt is an allowable deduction, that is under the A tax bases. Where no retentions are available as an alternative source of finance then clearly the cost of capital must be the coupon rate which we assume here to be the market rate r . Where retentions are available under the AE base then the cost of capital can never be less than r , but where it is sub-optimal to use debt instead of retentions, i.e. where distributions should never have been made, then the cost of capital will be increased. It will be increased to a level such that, after interest has been paid at the rate r , there remains income net of corporation tax the capitalised value of which, net of capital gains tax, equals the saving forgone by distributing rather than retaining. The saving forgone will, from expression (20), be:

$$(1 - c_u)(1 - c_d)(1 - g) - (1 - c_d)(1 - m) \quad (43)$$

$$= (1 - c_d)[(1 - c_u)(1 - g) - (1 - m)] \quad (44)$$

The income before corporation and capital gains tax necessary to generate a capitalised value of that amount will be:

$$r(1 - c_d)[(1 - c_u)(1 - g) - (1 - m)] \times \frac{1}{(1 - c_d)} \times \frac{1}{(1 - g)} \quad (45)$$

which simplifies to

$$r \frac{[(1 - c_u)(1 - g) - (1 - m)]}{(1 - g)} \quad (46)$$

so that the cost of capital is r plus that income, that is:

$$r \left[1 + \frac{(1 - c_u)(1 - g) - (1 - m)}{(1 - g)} \right] \quad (47)$$

always provided that m is < 1 .

Under the AF base we start with a similar proposition that the cost of capital cannot be less than the coupon rate r . However, with first year allowances available, only an amount of $(1 - c_d)$ need be borrowed to finance a unit of investment, so that the minimum cost of capital is effectively reduced to $r(1 - c_d)$. This minimum is increased whenever, notwithstanding the benefits of debt

Table 2
Corporate cost of capital
k expressed as a factor of *r*

Source of finance (including only those which are optimal for same value of m)	Tax Base (Table 1)	Governing relationship	
		$k =$	(Expression)
RETENTIONS (given issued equity)			
R1	E	$\frac{r(1 - m)}{(1 - c_u)(1 - g)}$	(21)
R2	D F	$r \frac{(1 - m)}{(1 - g)}$	(13)
R3	A F	$\frac{r(1 - m) + c_d(1 - g)}{(1 - g)}$	(18)
DEBT			
D1 given retentions available	A E	$r \left[1 + \frac{(1 - c_u)(1 - g) - (1 - m)}{(1 - g)} \right]$	(47)
D2 given retentions available	A F	$r \left[(1 - c_d) + \frac{(m - g)}{(1 - g)} \right]$	(53)
D3 given no retentions available	A	r	(—)
EQUITY			
E1 given retentions available	D F	$r \frac{(1 - m)}{(1 - g)}$	(13)
E2 given no retentions available and assuming an acceptable level of future retentions, b	F	$r \left[\left(\frac{1 - m}{1 - g} \right) \left(\frac{1 - (1 - b)(1 - c_d)}{b(1 - c_d) + (1 - c_d) - 1} \right) \right]$	(42)

finance, it would otherwise have been optimal to have retained rather than distributed. As above, the cost of capital will increase to a level which gives an income, net of interest and corporation tax, the capitalised value of which gives after capital gains tax a sum equal to the saving forgone. That saving is, from expression (12):

$$(1 - c_d)(1 - g) - (1 - c_d)(1 - m) \quad (48)$$

which equals:

$$(1 - c_d)(m - g) \quad (49)$$

The income before taxes necessary to generate that amount will be:

$$r(1 - c_d)(m - g) \times \frac{1}{(1 - c_d)} \times \frac{1}{(1 - g)} \quad (50)$$

which simplifies to:

$$r \frac{(m - g)}{(1 - g)} \quad (51)$$

The cost of capital is thus:

$$r(1 - c_d) + \frac{r(m - g)}{(1 - g)} \quad (52)$$

that is

$$r \left[(1 - c_d) + \frac{(m - g)}{(1 - g)} \right] \quad (53)$$

The last term in the bracket is only relevant if it is positive, but given that the normal situation will be $m > g$, which is a necessary condition for there to be a saving as in (49), the term will not anyway be negative.

Conclusion

In this paper we have analysed the effect of taxation on corporate finance and investment policy. In so doing we have had regard not only to differential tax rates but to the different tax bases to which those rates may be applied. Clearly the analysis has taken place in an unreal context of certainty and a perfect capital market, whereas, of course, day to day decisions have to be made in an uncertain world with imperfect capital markets where there are transaction costs. Further our study has had no regard to the legal structure by which corporate finance is constrained. We have thus ignored the fact that the

whole of company law is founded on the idea that the ownership and control of the company should be through equity interests so that, for example, tax-inspired suggestions of 100% debt finance are in the legal context non-starters. Added to this we have also supposed that corporate finance and investment decisions will be determined only by reference to the objective of shareholder wealth maximisation, whereas, for example, distributions may be made as a signal aimed at retaining shareholder confidence rather than as a wealth maximising policy.

The most serious limitation might seem to be the assumption of certainty. In order to assess the significance of the results generated here, and before applying real world tax rates to them, we must therefore examine whether uncertainty would change the analysis and its conclusions.

Critical to our analysis was the assumption that the certain rate of return earned in the corporate sector continued to be available elsewhere after the introduction of the corporation tax. On the basis of this assumption we concluded that a corporation tax allowing only economic depreciation would result in a fall in value, by a factor of $(1 - c)$, of existing shares and of subsequent retained income and new equity (and debt under the DE base). In the context of certainty the underlying assumption does not seem unreasonable, but we may question whether this remains so under uncertainty.

We may consider a world in which securities are valued in accordance with the capital asset pricing model (ignoring the problem of multi-period application). Then the risky returns from securities will be valued by reference to their risk and the risk-free rate of return, the risk of an individual security being measured according to its contribution to the undiversifiable risk of the market portfolio.

The introduction of a corporation tax will clearly reduce the expected returns to the market portfolio and individual securities by a factor of $(1 - c)$.¹⁸ The risk of the market portfolio (measured by the standard deviation of expected returns) will also fall by a factor of $(1 - c)$, but the risk of an individual security i will remain constant since both terms in the risk measure $(cov(im)/Vm)$ are each reduced by a factor of $(1 - c)^2$.

Whether the value of the market portfolio will fall by a factor of $(1 - c)$ will depend on the dis-

count rate: if both the risky and the risk-free rate of return are freely available outside the corporate sector then as in our certainty model there will be a fall of $(1 - c)$. If, however, only the risk-free rate is available outside with the risky returns only available in the corporate sector, then the required rate of return would fall from $rf + (rm - rf)$ to $rf + (rm - rf)(1 - c)$

where rf = the risk free rate of return
 rm = the total rate of return to the market portfolio.

The value of the market portfolio would then only fall by a factor of

$$1 - \frac{rfc}{rf + (rm - rf)(1 - c)}$$

and the value of individual security i by a factor of

$$1 - \frac{rfc}{rf + (rm - rf)(1 - c)(cov(im)/Vm)}$$

In order to obtain orders of magnitude we will assume that risky returns are available outside the corporate sector so that values do reduce by a factor of $(1 - c)$ in accordance with our certainty model. Table 3 shows the values of m at which indifference arises as between the finance and investment options listed. In solving the relevant equations for m , the given values for c_w , c_d and g will be those for the classical and imputation systems in force in the fiscal years 1972/3 and 1973/4 respectively. These are noted in Table 3.

The limitations that should be noted in applying these given rates are the simplifying assumptions made with regard to the tax system itself; in particular those which ignore:

- (i) the timing of tax payments, especially the differences as between returns taxed as income and those taxed as capital gains,¹⁹ and
- (ii) the lower marginal rates of capital gains tax.²⁰

The implications for the financial cost of capital are presented in graphical form:

Figure 1: whether to invest or not, given that debt interest is a disallowed expense;

¹⁹Following note (15), if we take the effective rate of g to be 15% (see King (1977)) then the values for m from expression (27) in Table 3 are reduced to 0.830 and 0.684.

²⁰King (1977) suggests that the median marginal capital gains tax rate 1965-72 for all shareholders (when some relief was available for small gains) was 30%.

¹⁸This assumes a constant corporate tax rate with perfect loss offsets.

Table 3
Values of m for indifference between optimal options

Tax base	Optimal options	Governing relationship	Value of m given Corporation Tax	
			Classical	Two Rate
DE	Given retentions, <i>Retain</i> or <i>Distribute</i> plus no reinvestment	$(1 - c_u)(1 - g) = (1 - m)$ (21)	0.580	0.664
AE	optional reinvestment and debt finance	$(1 - c_u)(1 - g) = (1 - m)$ (15)	0.580	0.664
DF	optional reinvestment and equity or debt finance	$(1 - g) = (1 - m)$ (13)	0.300	0.300
AF	required reinvestment and debt finance	$(1 - c_d)(1 - g) = (1 - m)$ (19)	0.580	0.520
A	Given no retentions, <i>Issue</i>			
F	Debt			
	Equity, plus 100% retention	$[2(1 - c_d) - 1](1 - g) = (1 - m)$ (27)	0.860 ¹⁹	0.740 ¹⁹
			Note given values of	Classical Two Rate
			g	0.300 0.300
			c_u	0.400 0.520
			c_d	0.400 0.314 ²¹

Figure 2: whether to finance investment through retentions or debt, given that debt interest is allowed, and:

Figure 2A: economic depreciation applies,
 Figure 2B: first year allowances apply.

Policies are shown throughout the range of m from 0.30 to 0.90 in order to show the consequence of sub-optimal policies for the cost of capital. Policies are only optimal for a given value of m where $k \leq 1$ and where k is minimised. Where k is not minimised because there is a cheaper source of finance, but is nevertheless ≤ 1 , then investment is preferable to non-investment. The difference between the cost of alternative sources of finance is a measure of the degree of sub-optimality.

In applying our analysis to an uncertain world we are of course also assuming, where relevant, something about the nature of debt finance: that it can be as risky as equity. As in our certain world the only difference recognised is with regard to distribution: equity allowing retention of returns, and debt requiring their distribution as interest. Risky debt would thus have a nominal coupon rate which matched the highest probable rate of return, while the expected value of the rate of interest would be the market expected rate of return to the applicable level of risk.

This type of debt is not that normally considered in discussions of debt finance; more common is the assumption, implicit in UK tax legislation, that debt is risk-free. The amount of risk-free debt that can be raised to finance risky investment is constrained, given limited liability, by the *minimum* probable return expected from the investment. Therefore any option which requires 100% debt finance will not, subject to the comment below with regard to diversification, be viable where the investment is risky. The only option not requiring full debt finance is that under the AF base, where advantage is taken of the distortion caused by the combination of first year allowances and interest deductibility. In this case if we add the requirement that debt be riskless then the option is only viable if $(1 - c_d)$ is the proportion of a unit of physical investment which can support risk-free finance.

However, more significant is the implication for diversification given an uncertain world with corporate risk-free debt and tax deductibility for interest. It is often claimed that there is no advantage in a company diversifying its productive investments since the individual can just as easily achieve an equal reduction in risk by diversifying his portfolio in the capital market. However, we can now see that this is not the case in a tax world allowing deductibility of interest on risk-free debt. A single company can, by diversifying away as much of its risk as possible, increase the

²¹Where, following note (3), s was 0.30.

Corporate cost of capital by source of finance

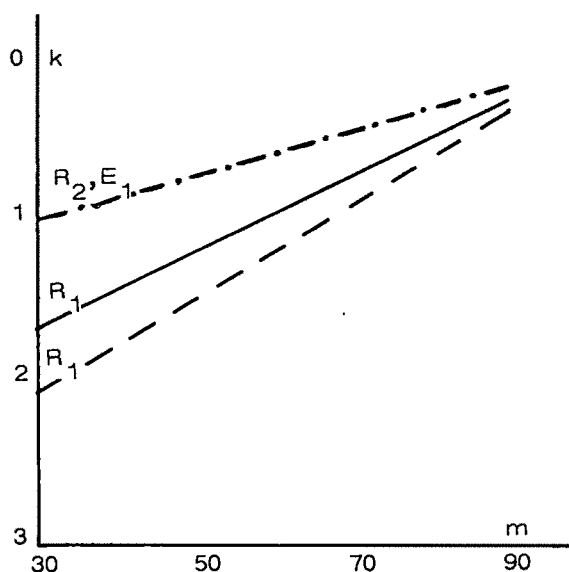


Figure 1

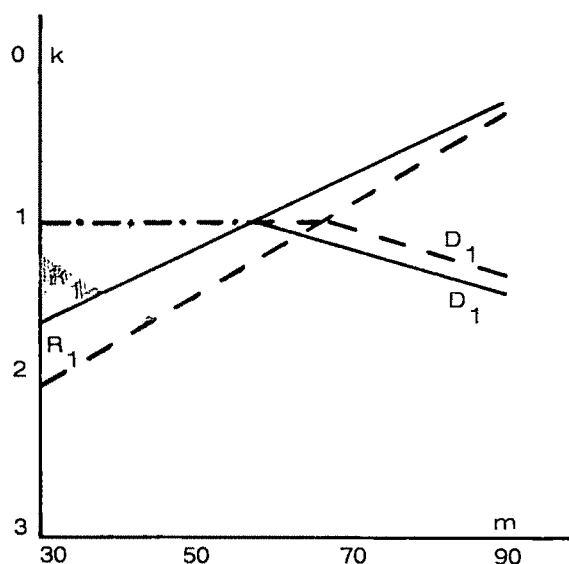


Figure 2A

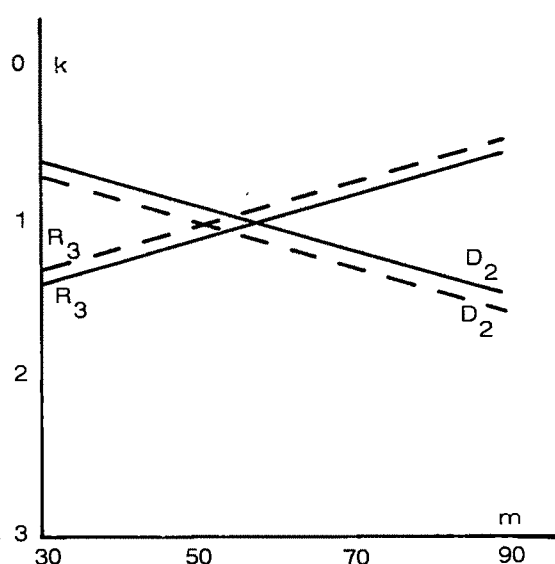


Figure 2B

— Classical system, ——— Two-rate system, -.-.- Both systems. Sources of finance labelled as for Table 2.

level of risk-free debt which it can support, and thus reduce the amount of corporation tax paid by the company and suffered (under our incidence assumption) by shareholders. The value of investors' portfolios would, therefore, be maximised where diversification is undertaken by companies in such a way as to maximise the level of risk-free debt.

In terms of the tax system, perhaps the most important conclusion from our analysis is that

first year allowances are important over and above all the other tax variables. As noted by King, this depreciation system neutralises the corporation tax; but it does so only in respect of what is effectively retained income. In the real world of transaction costs it speaks volumes for our tax policy making that, at the same time as 100% first year allowances were introduced, the corporate tax system was changed to one which, through its rate structure, favours distribution as

opposed to retentions. As Figure 1 makes clear, under the first year allowance system retentions will always earn at least the market rate of return.

We may similarly note from Fig. 2A that debt finance, where interest is allowable, also neutralises the corporation tax. However, where first year allowances are operative (Fig. 2B) these, combined with debt, distort the cost of capital to a level lower than the market rate of return. But both first year allowances and debt interest relief are combined with the distortionary personal tax system. This in all cases makes investments at less than the market rate acceptable for some values of m , and this effect is accentuated (Figs. 1 and 2B) where all three apply simultaneously. It should be emphasised that we have tended to *understate* the distortionary effect of the personal tax system by assuming that gains are taxed on an accruals rather than on a realisation basis. What is of least significance is the difference between the classical and two rate systems.

Given these tax-based distortions, there are clearly opportunities to optimise by the use of the right finance policy. However, as noted above, other constraints may work against the adoption of such policies. These may mean that investment should not be undertaken, or that it may still be beneficial, but not optimal, as regards shareholders. A comparison between 'financial' costs of capital indicates the cost of the constraints.

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An Analysis of the External Audit Fee

Martin E. Taylor and Robert L. Baker

Introduction

In recent years the audit function has come under critical scrutiny from management and other interested groups. Concern has been expressed about the escalating cost and time taken to complete the audit. Some have even questioned whether the cost to society of having an audit exceeds the claimed benefits (Briston and Perks, 1977; Fanning, 1978). A recent survey of 1,655 United States and Canadian companies indicated that a significant percentage of the companies felt that the audit fee was unreasonable (Hobgood and Sciarrino, 1972). Even public accounting firms have expressed deep concern about the rapid rise in audit costs. They attribute the rise to increased payroll costs, increased government regulation, peer reviews and increases in liability insurance (Arthur Andersen & Co., 1978).

Given the concerns expressed above about the audit fee it would seem that society might wish to have objective criteria for evaluating audit fees. Yet a majority of companies do not appear to have developed such criteria (Hobgood and Sciarrino, 1972). In this study those companies that did attempt to evaluate the adequacy of the audit fee listed, *inter alia*, the following as 'objective criteria':

- (i) Comparison of hourly rates with hourly rates paid to the internal audit staff.
- (ii) Comparison of current fees with the individual company's past fees.
- (iii) Size of company and location of its audit units.
- (iv) Relation of audit fee to sales.
- (v) Comparison of audit fee paid with those paid by other companies of similar size in the same industry.

All these procedures would seem to be of value. However, some, like percentage of sales, may prove misleading because studies have shown that the smaller firms tend to pay a higher percentage of sales than do larger firms. Also, some of the

information, like comparison with other firms, may be difficult to come by.

Given the concern expressed about the cost of the audit function it may be relevant to ask: What are the factors associated with audit fees? Are there any models a manager might use that would indicate that his audit fee is out of line when compared with other companies? No such models exist and one of the objectives of this study is to develop such a model. Most of the studies that have explored audit fee structures have focused on fairly simple relationships such as percentage of total assets or percentage of sales. It is probable that the audit fee relationship is more complex than this. For example, the complexity of the business enterprise, its size, the strength of the internal control system, the number of branches or subsidiaries the company has (both foreign and domestic), and the degree of automation and decentralisation of the accounting records, all have some influence on the audit fee structure.

Sales and total assets can be misleading measures. Possibly more information can be obtained from studying the composition of these items, particularly the assets. Audit fees are sometimes linked to asset size on the theory that the larger the company the higher the audit fee. However, it may also be argued that the larger the firm the more likely it is to have a strong internal control system. If the auditor can place a great deal of reliance on the internal control system then the scope and extent of the audit can be reduced; this will result in less audit time and therefore a lower audit fee. Thus it may be argued that as firm size increases, as measured by sales or assets, the audit fee as a percentage of these measurements will decrease.

Previous related studies

Hobgood and Sciarrino surveyed a number of US and Canadian manufacturing companies and found that in 1970 the average US company was

paying approximately 0.04% of its annual sales in audit fees. However, this percentage ranged from 0.18% for companies with sales under \$50 million to 0.03% for companies with sales over \$1 billion. The average audit fee paid by Canadian manufacturing companies was 0.02% of annual sales volume.

Fanning, in a 1977 study, attempted to estimate the total amount of audit fees paid in the UK. Adjustments for economies of scale were made by dividing the sample into three categories: small, medium and large companies. In an earlier study (1977) Briston and Perks also tended to show that the larger the company the smaller the proportion of audit fee to sales. For example, for the largest fifty companies the proportion of audit fee to sales was 0.05% and for those ranked between 451 and 500 the percentage increased to 0.0185%.

Both of the latter studies attempted to estimate the total cost of the external audit function. The Fanning study estimated the cost to be around £415 million for 1976/77 and the Briston and Perks study estimated £200 million for 1975/76 and £250 million for 1977. The wide discrepancy between the two studies illustrates the danger of using very simple relationships (such as percentage of sales) to imply associations.

Elliott and Korpi (1978) analysed the effects of a number of variables measuring size, industry and complexity on audit fees. Their sample was drawn from the clients of Peat, Marwick, Mitchell and Co. in the USA. In general, they were able to explain a significant amount of the variance in audit fees. Although they did not state whether or not any other measures of size were tested, their most successful models used the size measures of total assets and sales. The complexity variables were based on the subjective judgments of auditors assigned to the individual clients. Such judgments would naturally not be available as public information. They adjusted for economies of scale by using the square root transformation for those variables thought to be so affected.

This study differs from any of the previous ones in that it systematically examines publicly available accounting information in terms of its effect on audit fees. It examines the clients of a number of accounting firms in the manufacturing sector. Along with the major size variables such as total assets and sales, the individual components of these variables are also analysed to determine their association with audit fees. The complexity variables of number of subsidiaries and countries in which registered are obtained from publicly available accounting statements.

Scope

This study endeavours to identify and describe certain of the factors associated with audit fees. Specifically, it investigates the relationship between audit fees and selected size and complexity measures of the organisation being audited. The size measures include (1) assets and liabilities and some of the individual components that make up assets and liabilities and (2) transactions, as measured by sales. Measures of organisational complexity include number of subsidiaries and number of countries in which organised. Assessments of internal control, either for the total accounting system or for individual subsystems, were not included as variables in this study. Therefore, a certain amount of unexplained variance in audit fees was expected as a result of individual differences in internal control.

If relationships can be demonstrated between audit fees and measures of transactions, assets and liabilities, such relationships may indicate where major auditing effort is being expended. They may signal those accounting subsystems where improvements in internal control could be most profitably effected, and where accounting systems research redesign would pay the greatest dividends. If relationships could be shown between audit fees and any of the variables used in this research they may help to explain and justify individual differences in fees. A regression equation will be developed. This equation could be used by managers to evaluate the reasonableness of their company's audit fee.

Data

Data for this investigation were taken from the annual reports of a random sample of 126 British manufacturing companies as listed in Dun and Bradstreet's *Principal International Businesses* (1977) with sales greater than £100 million. The sales cutoff figure insured that all of the companies were multinational. Data for both 1976 and 1977 were obtained and analysed, in order to study the stability of the relationships over time.

Variables

In general, variables were categorised into groups measuring size and organisational complexity. Two measures of size, total assets and gross sales, have been reported upon in other studies (see above). It was expected that increasing total assets and increasing gross sales would result in larger audit fees. In addition, total assets

and gross sales were expected to exhibit economies of scale, e.g., doubling the size of total assets would increase but not double the size of the audit fee.

In addition to sales and total assets the following variables were chosen, based on their expected effect on total auditing expense:

Cash. This is one of the components measuring size of a company. It was expected that the larger the cash position, the larger would be the audit fee. In addition, cash would be expected to exhibit economies of scale. For example, a company with twice as much cash would not be expected to incur twice as large an audit expense.

Sundry Debtors. This variable is another component in the overall measurement of size. The larger the sundry debtors position, the larger the audit fee was expected to be. Sundry debtors was also expected to demonstrate economies of scale.

Stocks. This is another component in the overall measurement of size. Again, it was expected to have a positive relationship with total audit fee and to demonstrate economies of scale.

Current Assets. As much audit time is spent on verifying current assets there should be a positive relationship between audit fee and this variable. Current assets was expected to demonstrate economies of scale.

Sundry Creditors. A significant part of the audit is spent on establishing that there are no unrecorded liabilities. Sundry creditors was expected to demonstrate economies of scale.

Current Liabilities. This variable will capture the other current liabilities that are not part of sundry creditors. Current liabilities was expected to demonstrate economies of scale.

Share Capital, Reserves and Long-Term Loans. Not much audit time is spent verifying share capital, reserves and long-term loans in most companies, so the size of these items should not greatly influence audit fees. However, the size of these items may be indicative of the size of the company and may therefore indirectly influence audit fees.

Profit Before Interest and Taxes. Profits were studied because this variable is highly correlated with company size, and also because of the expectation that accounting firms might possibly base some of their fee on the individual company's ability to pay in a given year. This would result in some income smoothing for the client. If auditors do in fact 'eat their fees' when the client is having a bad year, then increased profits should result in increased fees. Because of profits' correlation with

size, they were also expected to exhibit economies of scale.

Complexity Variables. Two measures of organisational complexity were obtained from the financial statements. These were the *number of subsidiaries* and the *number of countries* in which the company operated. The first of these, number of subsidiaries, is a measure of legal complexity, and to a lesser extent, accounting systems complexity. For example, it would generally be expected that a company with a large number of subsidiaries would have numerous and nonhomogeneous accounting subsystems. However, if the accounting system was highly centralised or standardised among the individual subsidiaries, the system complexity, and possibly the audit task within the system, would be reduced. The second complexity measure, number of countries in which organised, is a measure of legal, systems, linguistic and currency translation difficulties for the auditor. It was expected that the number of subsidiaries and the number of countries, like the size variables, would also be positively correlated with audit fee. The complexity variables were not expected to show significant economies of scale, although a case could be made that the auditor might experience a learning curve in dealing with numerous subsidiaries and foreign operations. Finally, it was expected that the complexity factor would not be entirely independent of the size factor, e.g., the larger companies would tend to have more subsidiaries and be organised in more countries.

Research design

This study endeavours to develop a predictive model for audit fees for individual companies of the form:

$$Y = A + B_1X_1 + B_2X_2 + \dots + B_nX_n$$

where

$$Y = \text{audit fee}$$

X_1, X_2 , etc. = independent variables measuring size and organisational complexity that are publicly available from financial statements, and

A, B_1, B_2 , etc. = intercept and slope coefficients developed using multiple regression.

Such a model may be of possible use as additional information for management and others interested in assessing the equity of audit fees.

The first step in developing a predictive model was to obtain correlations between audit fee and each of the independent variables thought to be a measure of company size. Each of the independent size variables was then transformed by calculating its square root. A second set of correlations was then obtained, between audit fee and each of the transformed independent variables. The two sets of correlations were then compared, to indicate whether or not the association (R^2) between audit fee and the independent variables could be improved by using the square root transformation. Such a transformation has been suggested by Elliott and Korpi (1978).

The second step in the design consisted of a factor analysis of the independent variables. Factor analysis is a data reduction technique necessary to compensate for the expected correlation between the individual size and complexity variables. Factor analysis was applied to the entire sample of 126 companies. Since the total sample would be randomly divided into two separate subsamples of 63 companies each for modeling purposes, a factor analysis was also conducted for the two subsamples. The goal of the factor analysis in each case was to identify the individual factors of the independent variables. It was expected that the factors, or dimensions, would relate to (1) size and (2) complexity.

The third step was to develop multiple regression models based on the results of the factor analysis. A single variable was extracted from each of the individual factors that explained the largest amount of variance in the factor while at the same time it was negligibly correlated with the other factor or factors. The variables thus extracted became the independent variables in the regression models. The variables were used either in the untransformed state, or with the square root transformation, depending upon the correlation improvement indicated by the first step in the design.

Possibly a superior design would have used factor scores rather than the single individual variable from each factor. A preliminary study of this method indicated negligible improvement of the final model. In addition, the use of a single variable from each factor simplified the final model and reduced the computational effort.

A regression model was developed using the entire sample of 126 companies to determine the parameters. This model was then applied to predict the audit fee of each of the companies in the sample. A ratio of actual audit fee to predicted audit fee was then calculated.

It was expected that a model whose parameters were calculated from the total sample would do a good job of predicting the dependent variable for each of the individual companies in the sample. A better test of the predictive ability of the modeling process would be a split sample design. To accomplish this, the sample was randomly divided into two equal subsamples of 63 companies each. These were designated subsample one and subsample two. Model parameters were then calculated from subsample one and this model was used to predict audit fee for each of the individual companies in subsample two. The process was then repeated, developing the parameters from subsample two to be used in a model for predicting audit fee for each of the individual companies in subsample one.

Findings

Figure 1 displays the correlations between each of the independent variables and audit fee. The highest correlation is between audit fee and current assets. Figure 1 also indicates that correlation with audit fee was improved for each of the size variables when the square root transformation was applied. Because of this, the remainder of the research was undertaken using only the transformed values of the size variables.

The correlation study also indicated that, as expected, the size variables were highly correlated with one another. For example, the correlation between total assets and current assets was 0.97. The correlation between the complexity variables of subsidiaries and countries was also relatively high, 0.69. A relatively small correlation was found between size and complexity variables, however. The correlation between total assets and subsidiaries was 0.22, for example.

The varimax rotated factor pattern for the total sample is shown in figure 2. The size variables are primarily associated with factor one and the complexity variables are primarily associated with factor two. Total assets explain the most variance in factor one and at the same time do not substantially enter into factor two. Subsidiaries explains the most variance in factor two and is not substantially a part of factor one. Factor patterns for the two subsamples were nearly identical to the factor pattern for the total sample. Therefore, total assets (with the square root transformation) and subsidiaries are the independent variables used in all of the regression models.

Figure 1
Correlation Coefficients for Dependent Variable Audit Fee

<i>Independent Variable</i>	<i>Untransformed Data</i>	<i>Square Root Transformation</i>
Subsidiaries	0.26	
Countries	0.36	
Profit Before Interest and Taxation	0.33	0.37
Current Assets	0.79	0.80
Current Liabilities	0.77	0.78
Total Assets	0.77	0.78
Cash	0.50	0.53
Sundry Debtors	0.73	0.73
Stocks	0.69	0.71
Sundry Creditors	0.71	0.72
Share Capital and Reserves	0.70	0.74
Long-Term Loans	0.61	0.61
Sales Turnover	0.68	0.69

The regression step produced models as follows:

$$\text{Audit fee} = -295,000 + 29.6T_a^{\frac{1}{2}} + 3,500S_u$$

(for total sample)

$$\text{Audit fee} = -301,000 + 30.2T_a^{\frac{1}{2}} + 3,300S_u$$

(for subsample one)

$$\text{Audit fee} = -290,000 + 28.7T_a^{\frac{1}{2}} + 4,000S_u$$

(for subsample two)

where

T_a = total assets, and

S_u = number of subsidiaries.

Using the *t*-test, all of the betas in the above equations were found to be significant at the 0.01 level. The total sample was able to explain 79%

($R^2 = 0.79$) of the variance in the total sample. Using the total sample model to predict the audit fee for each of the individual companies resulted in actual fees that were at least twice as large as the predicted fees in 5% of the cases (six of the 126 cases). Actual audit fee was less than one half of the predicted fee in 10% of the cases (13 of 126 cases).

For the split sample design, model parameters were first calculated from subsample one and this model was used to predict audit fee for each of the companies in subsample two. This procedure produced predicted fees whose correlation (R^2) with actual fees was 0.72. Actual audit fee was at least twice predicted audit fee in 8% of the cases (five of 63 cases). Actual audit fee was less than one half of predicted audit fee in 8% of the cases.

Model parameters were then calculated from subsample two and this model was used to pre-

Figure 2
Rotated Factor Pattern

<i>Independent Variable</i>	<i>Variance Explained in Factor One</i>	<i>Variance Explained in Factor Two</i>
Subsidiaries	0.13	0.91
Countries	0.28	0.84
Profit Before Interest and Taxation	0.81	0.08
Current Assets	0.94	0.29
Current Liabilities	0.92	0.28
Total Assets	0.97	0.18
Cash	0.81	0.27
Sundry Debtors	0.89	0.37
Stocks	0.90	0.25
Sundry Creditors	0.93	0.24
Share Capital and Reserves	0.91	0.21
Long-Term Loans	0.89	0.11
Sales Turnover	0.92	0.22

dict audit fee for each of the companies in subsample one. This procedure produced predicted fees whose correlation (R^2) with actual fees was 0.82. Actual audit fee was at least twice the predicted fee in 5% of the cases. Actual audit fee was less than one half of predicted audit fee in 11% of the cases.

Conclusions

Our study tends to confirm Elliott and Korpi's (1978) research showing that the square root transformation improves the correlation of size variables with audit fee. For our sample of manufacturing companies it appears that the single variable of current assets is more closely associated with audit fee than either total assets or sales, which are the two independent variables most often used in studies to date.

In a multivariate context, factor analysis is able to clearly differentiate between the size and complexity factors. Total assets and subsidiaries, respectively, explain the majority of variance in these two factors.

The multiple regression models consistently display a negative intercept term. This is contrary to the expectation that there is a fixed cost to an audit engagement. One possible explanation is that the fixed cost element of the audit is small or negligible. In any case, no significance should be attached to the predictions of the model when the combination of total assets and subsidiaries of a

company is small enough to result in the prediction of a negative audit fee. In addition it would not be appropriate to apply the model to companies with sales smaller than our cut-off size of £100 million.

The models may be of interest to managers, internal accountants, and others interested in assessing the audit fee charged to individual companies. If the actual audit fee is more than twice as great as that predicted by the model, it is an indication that the company is in the top 5–10% in terms of audit cost. This may be a departure point for investigating the cause. On the other hand, a company whose actual audit fee is less than one half of the predicted fee would have some indication that its fee was among the lowest 5–10%, and may possibly be a bargain.

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Merchandising of Slaves as Portrayed in the 15th Century Ledger of Jachomo Badoer, a Venetian Merchant

E. Peragallo

Commerce in slaves constituted one of the more lucrative activities in Levantine trade in Renaissance Italy and was habitually practised by Italian merchants on all markets of the Mediterranean.¹ A rich source of such merchandising of slaves² is the 15th century ledger of Jachomo Badoer, a Venetian merchant, who spent more than 3 years in Constantinople trading for his own account, in partnership with his brother Jeronimo and for the account of Venetian resident merchants. The ledger is a unique source of inestimable value, because it is the only record of Byzantine commerce of the first half of the 15th century that has survived in its entirety the sack of Constantinople in 1453.³

Among the many diverse wares Badoer merchandised, slaves, designated as 'heads for my account' (*teste de mia raxon*) on ledger folio (LF)45, merit special attention. Badoer traded in slaves primarily for his own account, though a few were acquired for the account of clients as in the instance of 'Heads for the account of ser Nofride Chalzi' on LF135. To place these in their proper perspective, Badoer's total investment in 'heads' was about 5000 perpari during his whole stay in Constantinople in comparison to tens of thousand of perpari⁴ in other wares.

Ethical judgements are not made here, but the connection of 'heads' (*teste*) with 'heads of cattle' is inescapable. They were considered 'property' and treated with the care and consideration normally accorded valuable property. Badoer, however, seems to have had some scruples about this status of slaves, because, in at least one instance, he had a boy of about 15 years of age baptised and named him 'Terzo' (LF45), presumably because he was the third slave he had acquired.

Acquisition practices and standards

The source of the slave trade was the Black Sea area and it gravitated to the slave market in Constantinople. The Badoer ledger points to many slave traders, since Badoer rarely acquired slaves from the same trader or agent.

Upon acquisition of slaves Badoer would indicate their nationality: Russian (*nazion rosa*), Tartars (*teste tartare*), Circassian (*teste 8, femene zirchase e avogaxe*) (LF45). Also their names, approximate ages and physical characteristics were listed, such as a 'female slave...dark-skinned with a scalded hand, called Madalena...' (LF21) and '5 female slaves adult and handsome' (LF45). Of particular importance was the state of health, noted with each acquisition, as indicated in the purchase for 'cash paid to ser...genoese...of the Russian redhead female slave...called Maria...free from all sickness according to custom' (LF45), and in another instance 'an avogaxo slave that he sold to me in good health according to custom'. These health standards apparently governed the slave trade and unhealthy slaves were returned to the vendors as damaged merchandise, as shown on LF260 where a 'female slave...was

¹Astuti, G., 'Le forme giuridiche della attività mercantile nel libro dei conti di Giacomo Badoer, (1436-1440)' *Annali di Storia del Diritto*, XII-XIII (1968-69), pp. 86-87.

²The reading of Dale Flesher and Tonya L. Flesher, 'Human Resource Accounting in Mississippi Before 1865', *Accounting and Business Research*, Special Accounting History Issue, 1980, pp. 124-129 prompted this paper.

³Dorini, U. e T. Bertelè, eds., 'Il libro dei conti di Giacomo Badoer, il nuovo Ramusio', raccolta di viaggi, testi e documenti relativi ai rapporti from l'Europa e l'Oriente a cura dell'Istituto Italiano per il Medio ed Estremo Oriente, III, pp. xv 857 (Libreria dello Stato, 1956), at pp. ix-x.

⁴The currency of Constantinople was composed of perpari, carati and duchateli, with 24 carati to a perparo and 1½ carato to a duchatelo. See Peragallo, E., 'Jachomo Badoer, Renaissance Man of Commerce and his Ledger', *Accounting and Business Research*, Special Accounting History Issue, 1980, at p. 94.

sent back from Chania because she was sick and was returned to Bortolamio Zentil'.

The price Badoer paid for slaves averaged about 90 to 95 perpari, with a high of 114 perpari for the sixteen year old redhead Maria, whom he kept to manage his household in Pera on the outskirts of Constantinople, and a low of 70 perpari for 'balaban' Tartar slaves (LF45 and 172). Badoer also details expenses incurred on behalf of slaves such as payments of 2 perpari for 14 pics of linen for two chemises for two female slaves, 13 perpari for three pelisses, three slave frocks and one pair of shoes, and 2 perpari for two pairs of irons for 'balaban' slaves. No such restraints are mentioned for other male slaves. Also recorded are brokerage fees at one perparo per head, the Emperor's customs duty at 1%, and Badoer's purchase commission at 2% (LF135 and 172).

Disposal of slaves

Badoer disposed of his slaves in a number of ways. He kept two for his own household, the redhead Maria and an 'avogaxo' lad, 18 years of age called Zorzi. Most of the female slaves and young boys were shipped to Venice on galleys to be consigned to his brother Jeronimo for final disposal on the Venetian slave market. The 'heads' account was credited and Badoer's Venetian voyage (venture) account⁵ was charged at cost, the gain or loss to be determined in Venice (LF45). The balance, representing the bulk of the slaves, was sold on other markets on the Mediterranean Sea in differing fashions. In one instance, two Russian female slaves costing 190 perpari, plus $9\frac{1}{4}$ perpari for vestments and brokerage fees, were sold to Chania for 204 perpari cash, netting a narrow profit of $4\frac{3}{4}$ perpari, the broker being Francesco Chatelan (LF172). The most important use Badoer made of slaves was to finance, in part, his investment in two major Majorca voyages in partnership with other investors. The structure and financing of these two partnerships were different and warrant separate discussion.

Majorca voyage partnership—July 9, 1438

Badoer participated in the formation of the first Majorca partnership with two shares, 24 shares being the total shares issued, the rest being held by three other participants. The voyage was entrusted to two agents, one of them a partner, their commission to be $\frac{1}{4}$ of the realised profit from the venture (LF220).

Slaves were the most important element in wares to be traded. There were 182 heads, the majority shareholder contributing 150, all of them valued at the uniform price of $107\frac{1}{2}$ perpari, totalling 19,565 perpari. The rest of the wares included 600 chanters⁶ of cotton at 17 perpari per chanter and 700 chanters of native alum at 7 perpari per chanter for a total, including expenses, of 15,151 perpari, a total investment in the venture of 34,716 perpari. Badoer's share included 13 'balaban' slaves for $1,397\frac{1}{2}$ perpari and cash of $1,495\frac{1}{2}$ perpari to make up the total of 2,893 perpari, $\frac{2}{24}$ of the total investment in the enterprise. Since the cash did not increase the total capital of the venture, it undoubtedly was distributed pro rata to the other partners, which in effect paid for Badoer's pro rata share of wares contributed by the other participants.

The 13 'balaban' slaves cost Badoer 984 perpari, an average of 75 perpari 16 carati. They were credited to his 'heads' account (LF172) at $107\frac{1}{2}$ perpari, a total of $1,397\frac{1}{2}$ perpari, yielding a profit of $413\frac{1}{2}$ perpari on this contribution to his investment in the Majorca venture. This profit, of course, was not realised until the wares were sold and the net proceeds distributed pro rata. For reasons not mentioned in the ledger, the Majorca voyage partnership of July 9, 1438, was still outstanding, no allocation of proceeds made or indeed any indication of wares sold, when the ledger was closed on February 26, 1440, on Badoer's return to Venice, his stay in Constantinople terminated.

Majorca voyage partnership—January 22, 1439

The second Majorca voyage partnership was organised with only 20 shares issued. Badoer participated with three shares; the rest were held by three other participants, different from the ones of the first Majorca voyage partnership of July 9, 1438 (LF220). Again the voyage was entrusted to two agents, one of them a partner, but no mention was made of their commission (LF261).

The cargo was a varied one and, in this instance, was not contributed directly by the participants, but was purchased by the partnership, the cost allocated pro rata to the partners, which determined their investment in the venture. Heads, numbering 164, were purchased for cash and on time for a total of 17,048 perpari, at an

⁵Peragallo, E., 'The Ledger of Jachomo Badoer: Constantinople September 2, 1436 to February 26, 1440', *The Accounting Review*, October 1977, p. 888.

⁶One chanter weighed 150 pounds in Badoer's ledger and there were 100 ruotoli per chanter.

average cost of 103 perpari 23 carati. Other important wares acquired were 200 chanters of native alum at 7 perpari per chanter for 1,400 perpari, 601 chanters 31 ruotoli of cotton at 17 perpari per chanter plus expenses for 10,273 perpari, 100 chanters of copper at 17 perpari 10 carati per chanter plus expenses for 1,769 perpari 16 carati, also marten furs, lumber of various sorts and other items. Included among the costs was the chartering of the ship for 714 perpari 9 carati and provisions needed for the slaves costing 502 perpari 20 carati. The total outlay was 40,911 perpari 23 carati, an impressive sum. Badoer's share, after a correction, was 3/20 of the total for 6,103 perpari. Badoer's expectations on the outcome of this voyage were high. He had his brother Jeronimo in Venice take out three insurance policies to protect his share of the cargo for a total premium of 555 perpari (LF260).

In contrast to the first voyage, this venture was brought to termination, all cargo sold and net proceeds distributed before the ledger was closed. Badoer's share was 6,505 perpari 21 carati and, after some adjustments, the Majorca partnership account of January 22, 1439, was closed with a net loss to Badoer of 119 perpari 22 carati (LF260). Certainly not what Badoer expected.

Household slaves

Finally, there were the household slaves. Zorzi the 'avogaxo' slave, 18 years of age, was acquired on November 23, 1437, for use in the home (*teg-nudo per caxa*) (LF45). However, there is evidence in the ledger that he gradually progressed beyond simple house chores to more responsible duties.

It was the practice of Venetian merchants operating in foreign markets to take with them young apprentices from patrician families as assistants and to teach them about the mercantile practices of foreign trade.⁷ Badoer's first apprentice, Antonio Bragadin, died shortly after his arrival in Constantinople with Badoer (LF26). He was replaced by Lorenzo Tiepolo, who stayed with Badoer for about 1 year actively working as an assistant and engaging in trading, in a modest fashion, for his own account under Badoer's guidance. He appears to have left him by the end of 1438 (LF114, 260).

Badoer did not replace Lorenzo Tiepolo, but trained Zorzi in some of the duties of an apprentice. There is no evidence in the ledger that Badoer taught him the practices of the trade or

allowed him to engage in trading, but he did entrust him, among other things, with the collection of some of the receivables. On LF327, June 29, 1439, there is an entry for a 'payment of 205 perpari that ser Arseni Duodo made to Zorzi' and on LF342, July 20, 1439, another for a 'payment of 132 perpari that Piero dal Pozo made to Zuaneto [diminutive for Zorzi] my apprentice'. Zorzi is no longer referred to as my 'avogaxo' slave, but as my apprentice (*mio zovene* or *mio fameio*).

Toward the end of his stay in Constantinople, Badoer made the following debit entry in his personal account (LF357) crediting the cost of the 'avogaxo' slave to the 'heads' account:

... for my avogaxo slave, 20 years of age, called Zorzi, it is 2 years since I purchased him and kept him for my use, he cost me with expenses ... LF172 perpari 97.

The implications of this entry are not clear. There is the possibility that Zorzi was given his freedom and consequently Badoer removed the purchased cost of the slave from the asset account. It is also possible that he was taken to Venice.

There is less information about Maria, the Russian redhead, who was placed in charge of the household. The 'heads' account (LF172), at the closing of the ledger, shows only three elements, the realised profit of $4\frac{3}{4}$ perpari for the two Russian female slaves, the unrealised profit of $413\frac{1}{2}$ perpari for the 'balaban' slaves, and Maria's cost of 114 perpari plus 2 perpari for commission. There are also some unallocated costs for vestments and other minor expenditures for the slaves of 16 perpari 18 carati. All of these are netted and the amount of 287 perpari 18 carati is credited to profit and loss (see Appendix). This seems to indicate that Badoer did not intend to sell the slave, but to take her back to Venice. One possible difficulty with this interpretation is that Badoer already had a female slave in Venice, whom, because of his absence from Venice, he leased out to others, as the following entry on LF270 indicates:

...ser Jeronimo Badoer my brother... collected from the wife of ser Nicholò Dolfin, the balance of the salary of Lena my slave for 2 years [service] 11 ducats, valued at perpari 3 per ducat. ... LF270 perp. 33 car. 0.

Conclusion

The view that emerges from Badoer's ledger of the slave market in Constantinople during the

⁷Peragallo, 1977 (note 5), p. 881.

first half of the 15th century is one of intense activity, seen from the viewpoint of one merchant, whose interest in the trade is essentially peripheral. There is little doubt of the importance of the Byzantine market as a centre of the slave trade. Badoer's ledger points to a well structured market with sources of supply well established in the Black Sea area, a well organised market in Constantinople with brokers and counting-houses to facilitate marketing of slaves in large blocks, and their distribution to markets throughout the

Mediterranean by the merchants of Venice, Genoa and other Italian city states.

At this point in history, however, the Byzantine market was about to end with the fall of Constantinople to Turkish forces in 1453, with the consequent disruption of the lucrative slave trade.

Appendix

Shown are Badoer's own slave accounts. Principal entries are transcribed in full, the others are summarised.

LF45

Heads for my account debit 15 January 1437 for cash payment to ser...genoese for one	
redhead slave called Maria, Russian 16 years of age perp. 114, in good health according to	
custom, broker ser Piero dal Pozo, cash payment to him	LF16
on 24 May for two Turkish slaves, one male 15 years of age, whom I baptised and named	perp. 114 car. 0
Terzo, the other a female 20 years of age named Madalena, both for perp. 180, payment with	
one woollen cloth loeste, broker Zuan dal Pozo, total	LF64
on 7 August for Benedeto da Magnerne for 1/2 of the cost of eight slaves, 'zirchase and	perp. 180 car. 0
avogaxe' female, of which five are adult and good looking, ages 20 to 22 one about 28 years	
old, and two are young girls about 14 years old, clean and healthy according to custom, at	
perp. 91 each, payment for slaves to be made 3 months after arrival of the ship of ser Piero de	
Belveder at Venice, at perp. 3 car. 6 per ducat, brokers Zuan dal Pozo and Antonio Porto-	
nari; half of said slaves are for the account of ser Piero di Balveder, total	LF50
on 23 November for Charlo Chapelo from the bank, for a bank transfer to Inperial Spinola for	perp. 364 car. 0
the purchase of an avogaxo slave, 18 years of age, whom I kept for the home, sold to me in	
good health according to custom, broker Piero dal Pozo	LF141
Expenses for slaves and Badoer's 2% purchase commission	LF...
	perp. 95 car. 0
	perp. 27 car.12
	Total perp. 780 car. 12

LF172

Heads for my account debit on day 24 January 1438 for balance brought forward, for two	
slaves that remain in my house in my service	LF45
on 17 May for Bortolamio di Franchi, for purchase of one female slave tartara 22 years of age	perp. 210 car.12
perp. 90, broker Franzesco Zevolin, and for the ditto to ser Franzesco di Drapieri from the	
bank	LF169
on 8 July for Domenego Bontempo, for purchase of five 'balabani', two are 20 years old, one 25	perp. 90 car. 0
years, and two 30 years at perp. 70 each, total	LF220
on 16 ditto for Felipo da Lauto, for purchase of seven 'balabani' slaves at perp. 80 each, all	perp. 350 car. 0
between 20 and 25 years of age, brokers Zuan dal Pozo and Franzesco Zevolin . . .	LF222
on 22 July for one head for the account of ser Bortolamio Roso, a 'balaban' tartar slave . . .	perp. 560 car. 0
	LF222
on 9 May 1439 for . . . armin, for two female Russian slaves, one 18 to 20 years of age, the other	perp. 74 car. 0
13 to 14, both for perp. 190, terms all of June, broker Piero Chapelo	LF211
Expenditures for slaves and brokerage fees	LF...
on day 25 February 1440 for profit on 'heads' closed to profit and loss	LF405
	perp. 190 car. 0
	perp. 29 car. 6
	perp. 287 car.18
	Total perp. 1,791 car. 12

	LF45	
Heds per contra credit on day 24 May 1437 for the Venice voyage account for the cost of one Turkish female slave with expenses and placed on board ship of patron Domenego Frixon . .		
	LF45	perp. 102 car. 0
on 7 August for the Venice voyage for 1/2 the cost of eight female slaves, 'zirchasse and avogaxe', shipped in partnership with ser Piero de Belveder, to whom belongs the other half of said slaves, total with expenses and placed on board ship of patron ser Piero de Belveder .		
	LF82	perp. 372 car. 0
on 28 November for the Venice voyage for one tartar slave 16 years of age called Terzo, total with expenses placed on board ship of patron Rigo Doria	LF82	perp. 96 car. 0
on 24 January 1438 for this balance which I forward, for two slaves that remain with me at my house for my use, one Russian slave called Maria and one 'avogaxo' slave called Zorzi about 18 years old	LF172	perp. 210 car. 12

	LF172	
Heds per contra credit on day 27 May for the Venice voyage entrusted to my brother, for the amount of the contra entered female tartar slave with expenses placed on ship of patron Silvestro Polo	LF195	perp. 93 car. 0
on 9 July for my partnership in the Majorca voyage entrusted to Alesandro Zen and Aluvixe Falier, for the five 'balabani' entered contra, which I placed in ditto partnership as part of my investment for my two shares, at perp. 107½ each, total	LF220	perp. 537 car. 12
on 16 July for the above stated partnership for the amount of seven 'balabani' slaves, which I invested in the partnership, total at perp. 107½ each	LF220	perp. 752 car. 12
on 22 ditto for the ditto partnership for the amount of one 'balaban' tartar slave, whom I placed in the ditto partnership, priced as the others, total	LF220	perp. 107 car. 12
on 7 June 1439 for cash, remittance from . . . da la Chania, for two female slaves amount perp. 204, broker Franzesco Chatelan	LF327	perp. 204 car. 0
on 28 November for my personal expenditures for one 'avogaxo' slave, called Zorzi, whom I purchased two years ago and kept him for my use, he cost me perp. 95, total with expenses . .	LF357	perp. 97 car. 0
Total perp.		1,791 car. 12

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The International Harmonisation of National Income Accounts

Richard Stone

1. Introduction

Although it is impossible to be precise in such matters, national income accounting can be regarded as about forty years old. My reason for saying this is that in 1941 there appeared in at least three countries, Britain, Holland and Palestine, publications which made use of an accounting framework in setting out and relating information on economic aggregates. In Britain, the first White Paper containing estimates of national income and expenditure was published in April with the Budget [51]; and later in the year James Meade and I, who had largely been responsible for the estimates, published a paper on the construction of tables of national income, expenditure, savings and investment intended to clear up some of the problems of definition, indicate possible cross-checks and facilitate international comparisons if and when such tables came to be generally accepted [19]. In Holland, Ed. van Cleeff published two papers on a system of national book-keeping [64, 65]. And, in Palestine, Ludwig Gruenbaum (later Gaathon) published a book on the income and outlay of that country in which he made use of interrelated accounts for different parts of the economy [12].

Various precursors can be found in the 1930s. In the United States, Morris Copeland [5, 6] and Clark Warburton [67] were early to recognise the accounting aspects of national income studies. In Britain, Colin Clark, more than any of his contemporaries, published estimates of income, output, consumption, saving, investment and foreign trade in [3] though he did not set them out in an accounting framework. In Norway, over the years 1932–43, Ragnar Frisch directed work on the theoretical and practical problems of setting up a comprehensive national accounting system. Although it was never completed, the theoretical results provided the basis for all later Norwegian work in this field and, in particular, for a study by the Central Bureau of Statistics relating to the years 1935–43 which was published in 1946 [22].

In 1932 an important development took place in the United States: the Department of Commerce was charged with preparing national income estimates for each of the years 1929–31. The first fruit of this assignment was a substantial Senate Document covering the years 1929–32 which appeared early in 1934 [63]. It concentrated on total income classified by industry group and type of income payment and was prepared under the direction of Simon Kuznets. Subsequently Kuznets returned to the National Bureau of Economic Research but the work persisted and eventually a National Income Unit was established in the Department of Commerce. An excellent account of these and later developments has been given by Carol Carson [2].

2. The beginnings of harmonisation

In 1941 Milton Gilbert, who was to play an important role in international harmonisation exercises after the war, was appointed chief of the Department of Commerce National Income Unit. By this time considerable progress had been made with estimates of final expenditure, and in 1942 I published a set of accounts for the United States [39] on the lines of the Meade and Stone tables. I was able to cover the years 1929 through 1941 and I adjusted the American concept of national income to give as good an approximation as I could to the British concept. I then used the results to make a number of comparisons with the progress of war finance in Britain.

Gilbert commented on my paper and in the autumn of 1944 I was sent over to Ottawa and Washington to exchange views on the more difficult problems of national income estimation and, if possible, to bring about uniformity in terminology and in the treatment of controversial items. I went first to Ottawa where I met George Luxton of the Dominion Bureau of Statistics and we then travelled down to Washington where we spent a fortnight or so with Gilbert and his team.

Edward F. Denison, a member of that team, reported on the discussions to the American Conference on Research in Income and Wealth held in November 1945 [7]. As he said, 'The discussions were stimulating and led, partly through persuasion, partly through compromise, to substantial agreement on most of the principal matters at issue. Steps have been instituted in each country to implement these decisions by adjusting the published estimates. Uniformity in definition among these three major countries should greatly simplify the problems of the users of national income statistics. It is hoped that other countries may follow the treatment agreed upon.'

3. A tabular framework for the national accounts

At the time of the discussions in Washington there was no generally accepted system of national accounts and one outcome of the meetings was agreement on six or seven basic accounts which would satisfy at least the more pressing needs for national income statistics. No attempt was made to spell out in detail the entries in these accounts.

This task was performed in the following year as one of the last acts of the League of Nations' Committee of Statistical Experts. In 1939 the Committee had decided to include in its programme the statistical measurement of national income. Its activities were interrupted by the war but in 1945 a Sub-committee on National Income Statistics was appointed. I had been invited to visit the Institute for Advanced Study in Princeton after the war ended and I spent my time there drafting a memorandum on the definition and measurement of the national income and related totals. This paper served as a basis for discussion when the subcommittee met in Princeton under my chairmanship just before Christmas 1945. The report discussed the accounting approach to national income statistics, set out a tabular framework for the national accounts and referred specifically to the utility of the system as a basis for international comparisons. It was published, with my memorandum as an appendix, by the United Nations in 1947 [52]. Although it was not an agreed standard which had been widely discussed it was used as a general framework for *National Income Statistics of Various Countries, 1938-1947* [54] published by the United Nations in 1948.

4. The International Association for Research in Income and Wealth

National accounting raises interesting questions for the economist and offers useful answers to the policy maker. At the end of the war it was new and attracted a great deal of attention. The International Statistical Conferences, held in Washington in September 1947, provided an occasion for reunion to statisticians of all kinds. In the course of the meetings, a group interested in national income accounting met and formed a new association, the International Association for Research in Income and Wealth.

This is a small society of individual scholars which holds regular biennial meetings and publishes selected papers, originally in a series of volumes [13] but since 1966 in a quarterly journal [14]. At one time it provided a regular bibliographical service, and seven volumes covering the active years 1937-56 have been printed [15]. Although the Association has not been directly engaged in the work of international harmonisation, it has provided an international forum for those interested in such questions and has helped to create a climate of opinion favourable to international understanding and cooperation.

5. European recovery and the OEEC

In 1948, following the acceptance by the US Congress of the Marshall plan for European economic recovery, there was established in Paris the Organisation for European Economic Cooperation (OEEC), to which each state benefiting from American aid was required to belong. Since its initial purpose was to administer aid in the interests of recovery, it was important to have some means of monitoring and comparing economic progress in the different countries. Richard Rugles, a consultant in the American Economic Cooperation Administration in Paris, argued strongly in favour of the use of national income accounting for this purpose and wrote an introductory booklet on the subject [37] intended to be useful to people concerned with the European Recovery Program. His arguments were successful, and in 1949 the OEEC set up in Cambridge under my direction a small National Accounts Research Unit which continued until 1952, when its work was merged in that of the Organisation's Directorate of Statistics and National Accounts in Paris, which by then was under the direction of Milton Gilbert.

Three tasks were assigned to the Unit: first, to formulate a standard system of national accounts;

second, to describe the national accounting information available in each member country and adjust it to the standard; and, finally, to train in national accounting theory and practice economists and statisticians seconded to the Unit by member governments.

The Unit started work in the middle of 1949 on a simple system of accounts containing only the elements needed in building up the main national accounting aggregates but showing by means of a fully articulated system the precise nature of the component flows. No attempt was made at that stage to specify classifications of the main aggregates, such as national product, consumers' expenditure, asset formation and so on, because it was thought that more experience was needed before this could usefully be done.

A report entitled *A Simplified System of National Accounts* was published in April 1950 [24] and used to compile national accounts studies for Denmark, France, the Netherlands and Switzerland [25, 26, 27, 28]. A revised and extended version of the system was discussed at a meeting of statisticians from member countries in the autumn of 1951 and a second report entitled *A Standardised System of National Accounts* was published in 1952 [29]. This version was used to compile studies for Norway and Sweden [30, 31]. No other country studies were published. I wrote one for Britain but by 1954, when it was finished, work was advanced on the Central Statistical Office's *National Income Statistics: Sources and Methods* [49] which appeared in 1956.

The general plan of the national accounts studies can be seen from the first of the series, which relates to Denmark, although it was not possible to follow an identical arrangement in all cases. The eight sections are as follows:

(a) An outline is given of the sources, terminology and basic concepts used in the country so that the general approach adopted in the country can be understood before the innumerable details of classification and estimation are introduced.

(b) The accounting structure, as set out in the standard system, is completed for a number of years. The entries are adjusted so as to conform as closely as possible to the definitions of the standard. A brief account is given of the methods used to balance the accounts with a note of any items which are obtained as residuals.

(c) Detailed comments are given on the entries in the tables described under (b) and the

adjustments required to reach the items in these tables from the items in the country's own tables are specified.

(d) Since the available sources greatly influence the nature of the estimates that can be made, an account of the methods of compilation and the reliability of the estimates is given.

(e) Wherever available, detailed classifications are given. The object of this is partly to provide more information on the country concerned and partly to build up knowledge on classifications that have been found practicable in one country or another.

(f) The methods used in making short-term forecasts of the national accounts are described and the current forecasts, adjusted as far as possible to the standard definitions, are given. Since forecasts depend on aims and assumptions, this information cannot readily be made comparable from country to country.

(g) The information described so far is expressed at current prices. A brief account is given of the series available at constant prices and the methods of estimation adopted.

(h) A concluding section describes what is known of new developments in the preparation of the national accounts and in the sources available for this purpose.

As we have seen, six country studies were published between 1951 and 1953. From this time on the Organisation began to publish harmonised accounts based on the Standardised System. In order to do this, additional information was collected from member countries to enable the statistical adjustments to be made. The first report, prepared under the direction of Geer Stuvel, was published in 1954 [32]. It was confined to the gross national product and its components classified by major categories of expenditure. Estimates were given in total and *per capita* and in current and constant prices, and the adjustments made were described in detail. These adjustments varied considerably from country to country. Few if any were needed for those countries which conformed *ab initio* to the standard. For those that did not, the extent of the adjustments depended on the extent of the information received: in some cases this was sufficient to enable satisfactory adjustments to be made; but in others so little knowledge was forthcoming about the initial estimates that no adjustment, however desirable, was possible. It is reasonable to suppose that by now, over a quarter of a century later, improvements in sources and methods, revisions in standards and a

long experience of adjustments have combined to make the comparisons more reliable.

The Organisation for Economic Cooperation and Development (OECD), which replaced the OEEC in 1961, continues to publish harmonised estimates for member countries. These appear in *National Accounts of OECD Countries* [23].

6. The United Nations' System of National Accounts

I mentioned at the end of section 3 that in 1948 the Statistical Office of the United Nations published a substantial survey of the national income statistics of thirty-nine countries over the preceding decade [54]. A second edition going up to Statistical Papers series E began to appear and no. 2 in this series [56] continued the surveys up to 1950. In 1952 series H, *Statistics of National Income and Expenditure* [57], was started and continued to volume 10 at the beginning of 1957 when it was replaced by the *Yearbook of National Accounts Statistics* [58] which, greatly enlarged, continues to the present time.

Early in the 1950s it was decided that the UN should set up a standard system of its own which could take the place of the original League of Nations report as a general framework for assembling comparable international data on national income and expenditure. Accordingly, in July 1952 an expert group met at the Statistical Office under my chairmanship and by the end of the month the report was complete. It was adopted by the Statistical Commission at its meeting in February 1953 and published later that year as *A System of National Accounts and Supporting Tables* [59].

This system, usually abbreviated to SNA, was never very different from the Standardised System of the OEEC and after minor modifications following discussions in 1956 the two systems became virtually identical. Further small changes were introduced in a second revision in 1964 to improve consistency with the recommendations of the International Monetary Fund. Meanwhile plans were being made for a major extension of the system to include: production accounts for different industries, showing the flows of intermediate product between them (input-output); capital accounts for different sectors, including transactions in financial claims (flows of funds); and national and sector balance sheets, thus accounting for stocks as well as flows. In 1963 I was asked to prepare a draft of such an extended

system. I was chairman of the Expert Group which first discussed the new system in 1964: but times had changed. It was no longer possible to take a system through all its stages in a month, as had happened in 1952. This time, meetings were spread over five years with successive drafts going the rounds of the expert group and special groups convened by the UN Economic Commissions for Africa, Asia and the Far East, Europe and Latin America. The OECD took this opportunity to give up its separate system. It was represented on the expert group and adopted the revised SNA as a basis for reporting harmonised national accounts statistics for its member countries.

This elaborate procedure, far more time-consuming than the one deemed necessary in 1952, reflected the extent to which national income accounting had spread to the Statistical Offices of nearly all countries and the consequent need for wide consultation if the new version was to be generally accepted and used. In 1968 *A System of National Accounts* [60] was published as a third revision of the original system.

An indication of the size and growth of this reporting activity can be got from the size of successive publications. The first issue of series H, *Statistics of National Income and Expenditure*, appeared in 1952 with 58 pages; the first issue of the *Yearbook of National Accounts Statistics* appeared in 1958 with 236 pages; and the twenty-second edition of the *Yearbook* appeared in 1979 with 2,139 pages. Of these, 1,494 are accounted for by volume I on individual country data and 645 by volume II on international tables. It will be appreciated that the amount of information that can be reported varies greatly from country to country: for instance, Grenada occupies one page, the United Kingdom thirty-three.

Work on various aspects of the SNA has continued in recent years but it has not so far had much further impact on the publication of harmonised statistics and I shall not describe it here.

7. Alternative systems

For completeness, I shall now mention two other systems: the European System of Integrated National Accounts (ESA); and the System of Material Product Balances (MPS).

The ESA arose out of a decision, taken in 1964, to establish Community National Accounts to meet the rapidly developing requirements of the economic and social policy of the European Economic Community. The starting point was a report presented in 1964 by André Vanoli [66]

from which the ESA emerged in 1968 [8]. It is described as representing the Community version of the revised SNA.

The MPS is in use in the centrally planned economies of the Soviet Union, Eastern Europe and elsewhere. The relationship between this system and the SNA has long been an object of study by the Conference of European Statisticians, convened by the Economic Commission for Europe in Geneva, on which countries of both Eastern and Western Europe are represented. It became apparent from this work that the two systems, though superficially very different, were essentially alternative arrangements of the same basic data. When the revised SNA appeared in 1968 I constructed an accounting matrix for the MPS corresponding to table 1.6 of [60] and showed in [41] that it was possible to form a super-matrix from which either system could be obtained by a suitable grouping of its accounts. This suggests that, while it is meaningful to discuss the comparative advantages of the two systems for the uses to which they are generally put, it does not make sense to speak as if one were right and the other wrong.

In 1971 the Statistical Office of the United Nations published an authoritative account of the taxonomy of the MPS [61] and in 1977, a statement of the conceptual relationships connecting the two systems [62]. Reference is made in this last publication to a second part containing numerical illustrations of the conversion of national aggregates from one system into the other. As far as I know this has not yet appeared; but it would be extremely useful as it might pave the way for a uniform reporting of at least the main aggregates in the *Yearbook* [58]. At present market economies are reported in terms of the SNA while centrally planned economies are reported in terms of the MPS.

8. Comparisons in terms of a common unit of account: the beginnings

Up to this point I have been concerned with the uniform presentation of the national accounts of different countries in terms of a common format using common definitions and classifications. But the results for each country are expressed in the currency of that country and so it is impossible to compare levels. What is required is a means of comparing the purchasing power of the two currencies. How is this to be done?

In principle, the problems that arise in trying to answer this question are much the same as those involved in making comparisons over time in a single country. In practice, they are more difficult to solve because at any one time there are large differences between countries both in the goods and services produced and consumed and also in the relative values placed on them whereas in any one country these differences are usually comparatively small, at least when the span of the comparison is only a few decades. A short discussion of these problems is given in [42].

It might be argued that the exchange rate could be used as a proxy for relative purchasing power, and of course it could. But experience shows that, even under free market conditions, the exchange rate may prove a poor substitute because it is affected by factors other than those which influence the relative prices of goods and services consumed in each country. Nevertheless, exchange rates continue to be used in making international comparisons of real product, notably in the annual World Bank *Atlas* [68]. The compilers of this atlas are of course aware of the limitations of the method and the Bank is associated with a large project to compare purchasing powers in different countries; the results of this study, which are now in course of publication [17, 18], are described and illustrated in sections 11 and 12 below.

The pioneer in the use of prices in making a wide range of international comparisons was Colin Clark, the first edition of whose book, *The Conditions of Economic Progress*, appeared in 1940 [4]. Making use of the voluminous but still inadequate data available at the time, Clark set out to express the national incomes of all parts of the world in 'international units', a unit being defined as 'the amount of goods and services which one dollar would purchase in the USA over the average of the period 1925-1934'. Estimates considered accurate were made for thirty countries and approximate orders of magnitude for others. The estimates, which in the main covered the base period of the international units, were expressed per head of the working population and ranged from 1,381 in the United States to 100-120 in China. According to these calculations, more than half of the world's population fell into the lowest category, less than 200 international units per head. The book was rewritten twice and the new editions appeared in 1951 and 1957. It stands as a monument to the indefatigable energy of its author.

9. The OEEC comparisons of the 1950s

With the spread of national income estimation to more and more countries, the improvement in the quality of the estimates and the work of international harmonisation, the main difficulty in making comparisons in terms of a common unit came to turn on problems of product specification and the pricing of identical goods. A comparative study of the United States, Britain, France, Germany and Italy by Gilbert and Kravis [9] was published by the OEEC in 1954 and it was extended to cover Belgium, Denmark, Holland and Norway in [10] which appeared in 1958. In these studies the components of final expenditure were reduced to a common set of values and use was made of the concept of a set of average European relative price weights which provided a common basis for comparisons among the European countries.

In principle, the same results should be reached by comparing net outputs. In practice, complete agreement between the two methods is difficult to achieve. In a joint study sponsored by the OEEC and the Department of Applied Economics at Cambridge and published in 1959 [33], Paige and Bombach compared Britain and the United States in 1950 by the output method and found that, whichever country's prices were used as weights, the results were more favourable to Britain than those obtained by the expenditure method of Gilbert and Kravis. At the present time a similar study, involving West Germany as well as Britain and the United States and relating to a more recent period, is in progress at the National Institute of Economic and Social Research.

10. ECLA and the Latin American comparisons

For a variety of reasons, Latin American countries are particularly difficult to compare and the purchasing power parity approach, exemplified by the Gilbert and Kravis study, alone offers some hope of reliable results. The United Nations Economic Commission for Latin America published a set of comparisons in their bulletin [53] and Stanley N. Braithwaite, the Chief of the Special Studies Section, who was in charge of the work, contributed a long paper to the *Review of Income and Wealth* [1]. A detailed study by Richard Ruggles of price index-numbers based on these data appeared in [38].

11. The UN International Comparison Project (ICP)

This project, sponsored by the UN in association with the World Bank and the University of Pennsylvania, is the latest and most comprehensive study on these lines. It was begun in 1968 and phases one and two have so far been published [17, 18]. Phase one covers six countries in 1967 and ten in 1970. The original six are Britain, Hungary, India, Japan, Kenya and the United States, to which were added for the 1970 comparisons Colombia, France, the Federal Republic of Germany and Italy. Phase two gives comparisons for 1970 and 1973 and the list of countries is extended to sixteen by the inclusion of Belgium, Iran, the Republic of Korea, Malaysia, the Netherlands and the Philippines.

Phase three, on which work had been started before 1978, is intended to include more than thirty countries with 1975 as the reference date. After that, the programme is not clear but, if current comparisons are to be maintained, it will be necessary to choose future benchmark years for which a full set of comparisons can be made and to devise a means of interpolating between benchmark years. Further, methods must be found of fitting into the picture countries that cannot be accorded the full ICP treatment and of extending the inter-country comparisons to intertemporal comparisons at the same time.

A start has already been made on some of these problems. In [16, 43] the three principal authors of the ICP reports give approximate estimates of real gross domestic product per head for more than one hundred countries: and in the more recent of these papers [43] estimates are given for 119 countries which are linked across space in 1970 and through time using constant price data taken from the national income accounts of the countries. The series cover 1950 and the years 1960–77 and relate to private consumption, public consumption and domestic capital formation as well as to the GDP.

12. Some results of the ICP

Up to this point I have resisted the temptation to illustrate my remarks with statistical tables. Now that I have come to the end of my historical account, a few tables may help to bring out the kind of information to which all the work I have described leads. I shall not attempt to illustrate harmonised accounts expressed in local currencies, for which reference should be made to [58],

Table 1

Relative Gross Domestic Products per Head in 1970

	United States	Germany, Fed. Rep. of	France	Belgium	Netherlands	United Kingdom	Japan	Italy	Hungary	Iran	Malaysia	Colombia	Korea, Rep. of	Philippines	India	Kenya
United States	100	128	137	139	146	158	169	203	234	493	523	551	826	832	1446	1579
Germany, Fed. Rep. of	78	100	107	109	114	123	132	159	183	385	409	431	646	651	1131	1235
France	73	94	100	102	107	115	124	149	172	361	383	403	605	609	1058	1155
Belgium	72	92	98	100	105	114	122	146	169	355	377	397	595	599	1041	1137
Netherlands	69	88	94	95	100	108	116	140	161	338	359	378	567	571	993	1084
United Kingdom	64	81	87	88	92	100	107	129	149	313	332	350	524	528	917	1002
Japan	59	76	81	82	86	93	100	120	139	292	310	326	489	492	856	935
Italy	49	63	67	68	72	78	83	100	115	242	257	271	406	409	711	777
Hungary	43	55	58	59	62	67	72	87	100	210	223	235	352	355	617	674
Iran	20	26	28	28	30	32	34	41	48	100	106	112	168	169	293	321
Malaysia	19	24	26	27	28	30	32	39	45	94	100	105	158	159	276	302
Colombia	18	23	25	25	26	29	31	37	43	89	95	100	150	151	262	287
Korea, Rep. of	12	16	17	17	18	19	21	25	28	60	63	67	100	101	175	191
Philippines	12	15	16	17	18	19	20	24	28	59	63	66	99	100	174	190
India	7	9	10	10	10	11	12	14	16	34	36	38	57	58	100	109
Kenya	6	8	9	9	9	10	11	13	15	31	33	35	52	53	92	100

but shall concentrate on a few of the results obtained from the ICP.

The first thing we might wish to know is the relative position of different countries in terms of GDP per head of the population. This is shown in Table 1 for 1970 in the form of a ready reckoner for the sixteen countries included in phase two.

Table 1 is taken from [18, Table 1.3, pp. 12-13] and can be read as follows. Looked at vertically, each column gives all the countries listed down the side as percentages of the one named at its head; thus the column for the United Kingdom shows that in 1970 the German and Japanese GDP per head were respectively 123% and 93% of the British. Looked at horizontally, each row gives the country named at its side as a percentage of the countries named at the heads of the columns; thus the row for the United Kingdom shows that the British GDP per head was 81 per cent of the German and 107% of the Japanese. Since the calculations are based on a common set of values, the numbers in the Table are all consistent apart from rounding-off errors.

Let us now consider GDP per head in absolute terms and the uses to which it is put. This is shown for the sixteen countries in 1970 in Table 2.

Table 2 is based on [18, Table 4.5, pp. 96-99, and Appendix Table 4.5, pp. 158-165] and shows

in a highly condensed form the commodity detail given there. Each column shows for one country the GDP per head and its use after the categories have been made as comparable as possible and revalued in terms of a common set of prices. Items 1 and 2 represent current expenditures, counting even major durables acquired by households as current, and items 3 and 4 represent capital expenditures. Item 5 is simply the balance of trade in goods and services. Items 4 and 5, though small, tend to be highly volatile and so are shown separately.

For some purposes it is useful to present the kind of information set out in Table 2 in terms of percentages. This is done in Table 3 by dividing the entries in each column of Table 2 by its total.

Table 3 brings out a number of tendencies in the composition of final expenditure as we pass from rich countries to poor ones; for instance, the rise in the proportion spent on food and the fall in the proportion spent on durables. Another feature of the Table is the large proportion of the GDP devoted to domestic fixed investment in Germany and Japan matched by the markedly small share of private consumption in both countries.

Finally, it would be interesting to bring a larger number of countries into the picture. Table 4

Table 2

Components of Expenditure on Gross Domestic Product per Head in 1970

(1970 international dollars)

Table 2	Components of Expenditure on Gross Domestic Product per Head in 1970																
(1970 international dollars)																	
Reference numbers to [18: Table 4.5, pp. 96-99, and Appendix Table 4.5, pp. 158-165]	Components of GDP																
	United States	Germany, Fed. Rep. of	France	Belgium	Netherlands	United Kingdom	Japan	Italy	Hungary	Iran	Malaysia	Colombia	Korea, Rep. of	Philippines	India	Kenya	
1-110	1 Private consumption*																
1-34	(a) Food																
35-37	(b) Drink																
38, 39	(c) Tobacco																
40-51	(d) Clothing and footwear																
52-57, 60, 67-71	(e) House rent and running costs																
	(f) Major durables:																
58, 59, 61-66, 92	(i) household																
79, 80	(ii) vehicles																
81-84	(g) Vehicle running costs																
85-89	(h) Public transport																
72-78	(i) Medical care																
99-103	(j) Education																
90, 91, 93-98, 104-110	(k) All other																
149-153	2 Government consumption**																
111-146	3 Domestic fixed investment																
111-124	(a) Construction																
125-146	(b) Producers' durables																
147	4 Change in stocks																
148	5 Net exports																
1-153	Gross domestic product																
	4789.5	3746.9	3504.2	3449.2	3289.1	3039.1	2834.9	2356.1	2043.2	972.1	915.4	869.2	580.2	575.9	331.3	303.3	
*Includes most government current expenditure on housing, health, education, recreation and welfare.																	
**Excludes items specified in the preceding note.																	
Note: Components do not always add up to totals because of rounding-off errors.																	

*Includes most government current expenditure on housing, health, education, recreation and welfare.

**Excludes items specified in the preceding note.

Note: Components do not always add up to totals because of rounding-off errors.

Table 3

Components of Expenditure as Proportions of the Gross Domestic Product per Head in 1970

(percentages)

Reference numbers to [18: Table 4.5, pp. 96-99 and Appendix Table 4.5, pp. 158-165]	Components of GDP	United States, Germany, Fed. Rep. of, France, Belgium, Netherlands, United Kingdom, Japan, Italy, Hungary, Iran, Malaysia, Colombia, Korea, Rep. of, Philippines, India, Kenya																
		United States	Germany, Fed. Rep. of	France	Belgium	Netherlands	United Kingdom	Japan	Italy	Hungary	Iran	Malaysia	Colombia	Korea, Rep. of	Philippines	India	Kenya	
1-110	1 Private consumption*	68.1	56.3	61.3	66.0	62.3	67.1	56.7	66.2	65.9	66.5	65.8	71.0	71.7	77.2	70.6	68.8	
1-34	(a) Food	12.3	10.9	15.6	15.1	14.0	16.3	12.6	21.0	17.2	24.4	24.9	24.2	33.0	32.9	38.7	34.2	
35-37	(b) Drink	1.3	2.0	2.8	1.4	1.8	3.1	2.4	2.5	2.1	0.1	0.8	1.9	1.3	3.3	0.2	0.9	
38-39	(c) Tobacco	1.3	0.8	1.2	1.8	2.0	1.8	1.0	1.6	2.0	1.1	1.8	3.1	1.8	1.6	1.4	0.8	
40-51	(d) Clothing and footwear	5.6	5.4	4.3	4.8	6.1	5.7	6.4	5.6	5.4	6.5	4.9	5.5	7.0	5.1	4.1	2.6	
52-57, 60, 67-71	(e) House rent and running costs	14.2	11.9	11.5	13.4	11.7	12.8	7.6	11.5	8.5	15.7	10.3	8.3	6.3	11.8	7.5	7.9	
58, 59, 61-66, 92	(f) Major durables:																	
79, 80	(i) household	4.1	4.1	2.9	3.4	4.7	2.0	3.4	2.2	2.3	2.3	1.5	1.6	1.0	1.0	0.4	0.6	
81-84	(ii) vehicles	4.4	1.6	1.6	1.7	1.4	1.7	0.3	1.8	0.6	0.4	0.8	0.3	0.0	0.0	0.1	0.6	
85-89	(g) Vehicle running costs	5.3	2.6	2.3	1.9	1.8	2.9	0.4	2.5	0.5	0.9	2.2	0.9	0.0	0.1	0.4	0.8	
90-91, 93-98, 104-110	(h) Public transport	0.7	0.9	0.9	0.8	0.7	1.6	1.0	1.2	1.4	1.9	3.1	6.7	3.7	1.7	2.4	2.3	
111-124	(i) Medical care	3.7	5.0	6.0	3.9	5.2	4.5	7.4	5.8	6.2	2.7	3.6	3.5	3.8	2.0	3.3	4.1	
149-153	(j) Education	3.2	2.3	2.1	5.5	2.9	4.0	3.5	3.6	4.6	3.1	5.1	5.5	6.0	10.0	8.0	7.4	
149-153	(k) All other	12.1	9.0	10.1	12.3	10.1	10.6	10.7	6.8	15.1	7.6	6.7	9.6	7.8	7.6	4.2	6.7	
111-146	2 Government consumption**	12.0	6.9	8.3	6.7	8.3	10.0	5.0	7.0	8.6	10.4	10.5	8.9	13.3	10.1	14.2	16.3	
111-146	3 Domestic fixed investment	19.3	32.2	27.3	23.0	28.7	21.0	32.9	24.4	24.3	19.2	18.1	18.7	19.9	11.1	13.7	14.0	
125-146	(a) Construction	9.0	16.7	14.1	13.1	17.4	9.3	16.0	14.5	15.2	14.9	13.5	14.8	14.2	5.7	11.2	7.2	
147	(b) Producers' durables	10.3	15.5	13.2	9.9	11.3	11.7	16.9	9.9	9.1	4.3	4.6	4.0	5.6	5.4	2.4	6.8	
147	4 Change in stocks	0.3	2.2	2.3	1.6	2.6	0.9	4.0	1.8	3.3	0.2	2.8	2.3	1.8	1.8	1.8	2.0	
148	5 Net exports	0.3	2.4	0.7	2.8	-2.0	1.0	1.3	0.6	-2.2	3.7	2.8	-1.0	-6.7	-0.2	-0.3	-1.2	
1-153	Gross domestic product	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

*Includes most government current expenditure on housing, health, education, recreation and welfare.
**Excludes items specified in the preceding note.
Note: Components do not always add up to totals because of rounding-off errors.

*Includes most government current expenditure on housing, health, education, recreation and welfare.

**Excludes items specified in the preceding note.

Note: Components do not always add up to totals because of rounding-off errors.

Table 4

Classification of 119 Countries by Region and Size of Gross Domestic Product per Head in 1970 Expressed in 1970 International Dollars

Range in 1970 international dollars	Africa	Asia	Europe	N. and C. America	S. America	Oceania	Total
0-499	27	9		1		1	38
500-999	14	6	1	5	5	2	33
1000-1499	2	3	2	5	3		15
1500-1999		1	3	1	3		8
2000-2499			2		1		3
2500-2999	1	2	1	1			5
3000-3499			6			2	8
3500-3999		1	5	1			7
4000-4499			1				1
4500-4999				1			1
Total	44	22	21	15	12	5	119

shows the GDP per head of 119 countries in 1970 cross-classified by size and region.

Table 4 is based on the calculations given in [43]. In reading this Table several points should be kept in mind. First, the 119 countries contained in 1970 about two-thirds of the world's population. Second, the centrally planned economies are not included. Third, countries are of very different sizes and the picture would look different if the states or provinces of large countries were shown separately. Finally, there is a wide dispersion of incomes in all countries and the distribution of these incomes is positively skewed.

13. A summary of methods and achievements

From the description I have given of the progress made in the international harmonisation of national income accounts we can see the steps involved and the position that has been reached at the present time.

As regards methods, the following points can be made:

(a) The first essential is a standard system, based on a generally accepted set of definitions and classifications, to which the individual country estimates can be adjusted as far as possible.

(b) From time to time the standard has to be revised. This should not be attempted too often, partly because it tends to be a lengthy business and partly because some years of working with a given system are required before its good and bad points can be assessed.

(c) Comparisons over time are more useful if product flows are expressed in terms of a fixed set of prices. This leads to index-number problems, discussed in this context in [40], and also to the need to update from time to time the base year in terms of whose prices the calculations are made.

(d) Comparisons over space are more useful if they are made in terms of a common set of 'international' values. Constructing such a set of values is difficult, however, and requires a research team which can collect comparable price and quantity data in considerable detail from several countries and knows how to turn these data into meaningful indices.

As regards achievements, the position can be summarised as follows:

(e) Harmonised national accounts expressed in local currencies are now available in varying degrees of detail for a wide range of countries: standardised tables have been published regularly for several decades by international organisations on the basis of questionnaires filled in by the statistical offices of the member countries.

(f) Data are given in terms of the SNA for the market economies and of the MPS for the centrally planned economies. At present, however, there is no regular publication giving conversions from one system to the other, although there are a number of special studies, such as that by Greenslade in [11]. The World Bank *Atlas* [68] give only an approximate harmonisation based on exchange rates. The UN Statistical Office has brought out the first part of its study comparing the two systems [62] but the second part, containing actual conversions, has yet to appear.

(g) Harmonised accounts expressed in a single international unit of value are less developed, though much progress has been made since the pioneering efforts of Colin Clark forty years ago. The most advanced study in this field is that of the ICP [17, 18]. So far, the ICP 'full' estimates relate to only sixteen countries, but this number will be more than doubled in the third phase of the project. Meanwhile, the prin-

cipal authors have devised an approximate means of extending the number of countries to the 119 contained in Table 4 above.

14. Lessons for the international harmonisation of private accounts

In this final section I shall consider what lessons the work I have described might hold for the international harmonisation of private accounts.

(a) *Aims: closed and open systems.* The national accounts of a country provide a framework designed to accommodate, in varying degrees of detail, all the economic flows which take place over a period and all the stocks which exist at the beginning and at the end of the period. The system is closed by introducing one or more consolidated accounts for the rest of the world. Each entry has, in principle, a counterpart elsewhere in the system of accounts, and balance sheets are built up by accumulating entries in the accounts, allowance being made for revaluations. The construction of such a system of accounts and balance sheets cannot rely on a single source of information and in practice depends more on statistical than on accounting data. The international harmonisation of national accounts consists of adjusting individual country accounts to a standard based on an agreed set of definitions and classifications, and ultimately expressing the product flows in a common set of prices.

By contrast, the international harmonisation of private accounts, as I understand it, starts with the accounts and balance sheets of individual enterprises and the aim is to adjust them to an agreed standard. Thus there is a single source of data, business accounts, and the system is not closed except in the sense of double-entry book-keeping. Harmonisation in this case involves discovering the definitions, classifications and conventions used by individual enterprises and making the necessary adjustments, bearing in mind legal requirements and other institutional factors which may differ significantly between countries. Since enterprises do not generally publish a production account but instead begin with the composition and appropriation of income, continue with the sources and uses of capital funds and end up with a balance sheet, the emphasis on various analytical issues is likely to differ from that

placed on them in national accounting. In principle, the available parts of harmonised private accounts could be embedded in a national accounting system. In practice, it would be difficult to do this, partly because it would call for greater attention to a classification by legal form of organisation than is usual in national accounting and partly because it would require classifications of transactions some of which would be difficult to carry out in private accounting.

(b) *Harmonisation within a country: the British experience.* Since the 1948 Companies Act there has been plenty of experience in adjusting private accounts to a standard format. There is the pioneer work of the National Institute of Economic and Social Research, begun in 1950 [20, 21, 44] and continued by the Board of Trade and its successors as, for example, in [45, 46, 47, 48]. There is also the work started by Jack Revell at the Department of Applied Economics in Cambridge on the construction of national and sector balance sheets [34, 35], which was continued by Alan Roe [36] and eventually passed into the hands of the Bank of England and the Central Statistical Office [50]. This is not a harmonisation exercise in the usual sense, being designed to provide balance sheets, flow-of-fund accounts and revaluation accounts which could be fitted into the national accounts, but accounting as well as statistical data play an important part in it.

The National Institute study and its successors have concentrated on quoted companies above a certain size and have demonstrated that useful results can be obtained for this part of the business sector without the necessity of processing an excessive amount of data. Since other countries have carried out similar studies, the ground should be well prepared for a harmonisation project.

(c) *Scale and organisation: who is to do the work?* Experience with the national accounts shows that constructing and harmonising them are comparatively large undertakings, requiring teams rather than individuals and depending indirectly on many other people for the provision of data. It was fortunate, in the case of the national accounts, that central statistical offices assumed responsibility for their construction almost from the outset and that, with their help, international organisations undertook the work of harmonisation. One may ask who will undertake the corresponding roles in the case of private accounting.



(d) *Finance: sales or subsidies?* In the case of the national accounts, the finance has always been provided by the organisations that assumed responsibility for the work. In addition to maintaining a staff for the purpose, they have also hired consultants and small teams for special assignments. The idea of attempting to charge users for information does not seem appropriate in that context but the position might be different in the case of private accounting.

Evidently, there are differences in the problems posed by attempts to harmonise the two kinds of account. But there are also similarities and I hope that this brief history of the experience in national accounting will be helpful to those engaged in promoting the international harmonisation of private accounts.

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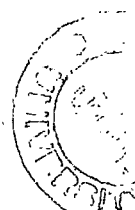
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Accounting Policy Making— Some Lessons from the Deferred Taxation Debate

Tony Hope and John Briggs

Deferred taxation is not a new topic. Companies have long wrestled with the timing problems created because certain types of transaction are treated differently in computing accounting profit from their treatment in the computation of taxable profit. But the strength of opinion expressed by participants in recent discussions in the United Kingdom as to how best to account for deferred taxation would certainly suggest that it is at least a contentious topic. Deferred taxation is, for example, the only subject considered to date (January 1981) by the Accounting Standards Committee (ASC) which has generated two *full* accounting standards, each of which has advocated a different accounting treatment. From initial exposure draft to latest standard, the ASC has spent a total of six years in discussions on the subject of deferred taxation.

An examination of the recent history of deferred taxation in the United Kingdom may, therefore, be instructive as an aid to understanding some of the issues faced by policy makers in their search for acceptable solutions to accounting problems of measurement and disclosure.

This paper is essentially descriptive, and is largely in the form of an historical review. It seeks to achieve two modest aims: first, to explain the issues at the heart of the deferred taxation debate, and in particular to explain why there occurred such a change of emphasis from the question of how deferred taxation should be measured to the question of whether it should be measured at all; and second, to suggest, in the light of the preceding review, that many criticisms of the ASC's current 'incremental' approach to standard setting may be invalid. The paper concludes with some tentative and largely intuitive suggestions as to how the current standard setting procedure might be improved.

The context of the deferred taxation issue

To understand better the background to the specific issues involved in determining an acceptable accounting treatment for deferred taxation in the United Kingdom, the topic should be placed in some overall context. Since 1970, this context has been one of accounting policy making in which the formal policymaker has been the ASC. Thus the debate on how best to account for deferred taxation has not been conducted purely in technical terms, but also in the political atmosphere in which the ASC necessarily operates. This point is important. It helps to explain many of the problems encountered by the ASC in formulating acceptable accounting standards.

There has been increased recognition in the past few years by professionals and academics alike that accounting policy choices of measurement and disclosure should not be thought of as solely technical, neutral choices, but rather as political, social choices involving the potential redistribution of wealth in society. For example, commenting on the role of the Financial Accounting Standards Board (FASB) in the USA, May and Sundem¹ state that 'Accounting information is like many other commodities produced in our economy today, the private market for such information is modified by explicit public policy decisions. . . . Therefore the FASB must consider explicitly political (i.e. social welfare) aspects as well as accounting theory and research in its decisions. . . . This implies that policy makers must go beyond comparing alternative policies regarding the degree to which their outputs conform to certain purely technical or aesthetic standards, e.g.

¹Robert G. May and Gary L. Sundem, 'Research for Accounting Policy: An Overview', *Accounting Review*, October 1976, pp. 747-63.

"true economic value", "true income", "relevance and objectivity", while Horngren² believes that 'the setting of accounting standards is as much a process of political action as of flawless logic or empirical findings.' We might also add that there has been increased doubt as to how these political choices are to be made without destroying the credibility of the policy making body.³

A main purpose of the ASC's work is to improve the quality of financial accounting and reporting by narrowing the permissible number of alternative treatments for any given topic. We can say that the ASC serves two distinct functions⁴ in the standard setting process:

(1) *A production function*

This involves the development of specific accounting standards on topics of importance chosen by the ASC.

(2) *A marketing function*

This entails an attempt by the ASC to ensure that its standards are acceptable to the (more powerful) elements of its broad constituency of preparers, users and auditors of external reports.

These two functions are linked by the ASC's current procedure of initially exposing the draft material in the form of an exposure draft (ED) for comment, analysis and, if necessary, amendment by interested parties prior to the issue of a statement of standard accounting practice (SSAP). The nature of the procedure places great emphasis throughout on the need to obtain the opinions of third parties as a necessary prerequisite of a policy decision. Indeed, it should also be stressed that, as part of its formal procedure, the ASC normally discusses *prior to the publication of an ED*, the contents of the draft accounting standard at a series of meetings with financial directors and senior officials of companies whose financial statements will most likely be affected significantly by the proposals under review. This whole procedure is intended to help gain acceptance of the final standard. We may describe it as a bargaining process between the ASC and its constituency, and, as with all bargaining processes, a

major key to success lies in the speed with which agreement (acceptability) can be reached. Thus a major task facing the ASC is to determine, for each issue it addresses, what constitutes acceptability of the outcome to the interested, and influential, third parties.

Not all accounting topics are equally contentious. The degree of interest shown by third parties in particular accounting issues varies substantially. One possible measure of this degree of interest may be represented by the number of replies received by the ASC to Exposure Drafts issued up to November 1980. Table 1 gives a breakdown of these replies by classification of respondent. A second, and perhaps more significant measure of the interest shown in particular topics is provided by Table 2, which indicates the progress from exposure draft to accounting standard of all topics dealt with to date by the ASC. The expected initial sequence is one prior exposure draft followed by one accounting standard; a procedure which the ASC suggests should normally take up to one year, in order to give adequate time to assess all views expressed on the topic. A close look at Table 2 reveals that in only three instances (ED1, ED2 and ED10) has the suggested time period been adhered to, but, more pertinently, it also shows that the logical sequence of one exposure draft followed by one standard has been attained in only two-thirds of the cases. That is, if ED8, PSSAP7, ED18, ED24 and SSAP16 may be classified broadly under one general topic heading of 'Accounting for Price Level Changes', then the ASC has looked at 17 different topics up to ED23, the latest topic on which an accounting standard has been issued to date (January 1981) and in 12 of these 17 cases, the expected sequence of events has been followed. We should stress here that a *secondary* sequence of exposure drafts and accounting standards, on issues which have already been subject to an accounting standard, will begin to appear as the ASC pursues its policy of regular reviews of existing subjects. For example, the review of SSAP 1 has produced ED 25, the provisions of which will generate a new standard.

The exceptions to the normal initial sequence of events deserve some mention. The areas concerned are accounting for acquisitions and mergers (an exposure draft was issued in 1971 which has failed as yet to produce an accounting standard), accounting for extraordinary items and prior year adjustments (this has resulted in three exposure drafts and one standard), accounting for research and development (two exposure drafts

²Charles T. Horngren, 'The Marketing of Accounting Standards', *Journal of Accountancy*, October 1973, pp. 61-66.

³For example, see the paper by D. Solomons, 'The Politicization of Accounting', *Journal of Accountancy*, November 1978.

⁴This functional approach to standard setting was first suggested by Horngren in the paper quoted in footnote 2.

Table 1
Analysis of Comments Received on Exposure Drafts

Number of ED	Subject of ED	Total Number of Comments Received	Practising Firms	Limited Companies	Associations, Representative Bodies and District Societies	Individuals		
						Academics	Others	Others
1	Associated Companies	152	22	51	26	7	46	
2	Accounting Policies	69	13	16	22	4	14	
3	Acquisitions & Mergers	88	28	17	32	4	7	
4	Earnings per Share	66	18	9	24	—	15	
5	Extraordinary Items	83	17	25	30	—	11	
6	Stocks	153	21	72	32	2	26	
7	Extraordinary Items	77	13	19	29	—	16	
8	Inflation Accounting	113	13	27	36	11	26	
9	Industry Grants	76	14	24	26	4	8	
10	Value Added Tax	52	9	11	27	—	5	
11	Deferred Taxation	118	25	44	33	4	12	
12	Taxation	67	18	14	27	—	8	
13	Funds Statements	98	22	29	32	6	9	
14	Research & Development	66	15	15	31	2	3	
15	Depreciation	101	21	36	31	4	9	
16	Extraordinary Items (Supplement)	79	19	27	26	—	7	
17	Research & Development	49	9	8	28	2	2	
18	Current Cost Accounting	746	83	336	123	30	174	
19	Deferred Taxation	115	26	29	43	—	17	
20	Group Accounts	85	18	28	33	—	6	
21	Foreign Currency Transactions	116	23	45	32	—	16	
22	Post Balance Sheet Events	91	23	29	31	2	6	
23	Contingencies	81	21	19	35	—	6	
24	Current Cost Accounting	248	34	75	74	—	65	

Source: *Accounting Standards 1980* (Institute of Chartered Accountants in England and Wales).

Table 2
Translations of Exposure Draft (ED) into Accounting Standard (SSAP)

<i>Exposure Draft Number</i>	<i>Topic</i>	<i>Date of ED Issue</i>	<i>Subsequent Withdrawal and Replacement</i>	<i>SSAP Number</i>	<i>Date of SSAP Issue</i>	<i>Time Period ED → SSAP</i>
ED 1	Associated Companies	June 1970	→	SSAP 1	January 1971	7 months
ED 2	Disclosure of Accounting Policies	January 1971	→	SSAP 2	(Reviewed by ED 25, Sept. 1979) November 1971	10 months
ED 3	Acquisitions and Mergers	January 1971	→	→	(In process of review)	→
ED 4	Earnings per Share	March 1971	→	SSAP 3	February 1972	13 months
ED 5	Extraordinary Items and Prior Year Adjustments	August 1971	→	SSAP 6	(Revised August 1974) April 1974	32 months
ED 6	Stocks and Work in Progress	May 1972	→	SSAP 9	(Supplemented by ED 16, Sept. 1975) May 1975	36 months
ED 7	See under ED 5	January 1973	→	P SSAP 7 (May 1974)—ED 18 (Nov. 1976)	→	→
ED 8	Accounting for Price Changes	March 1973	→	ED 24 (April 1979)	→	→
ED 9	Industry Grants	May 1973	→	SSAP 16	March 1980	86 months
ED 10	Value Added Tax	May 1973	→	SSAP 4	April 1974	13 months
ED 11	Deferred Taxation	May 1973	→	SSAP 5	April 1974	11 months
ED 12	Taxation	May 1973	→	SSAP 11 (Aug. 1975)—ED 19 (May 1977)	October 1978	65 months
ED 13	Source and Application of Funds Statements	April 1974	→	SSAP 8	August 1974	15 months
ED 14	Research and Development	January 1975	→	SSAP 10	July 1975	15 months
ED 15	Depreciation	January 1975	→	SSAP 13	December 1977	35 months
ED 16	See under ED 5	January 1975	→	SSAP 12	December 1977	35 months
ED 17	See under ED 14	→	→	→	(Supplemented by ED 26, Oct. 1980)	→
ED 18	See under ED 8	→	→	→	→	→
ED 19	See under ED 11	→	→	→	→	→
ED 20	Group Accounts	July 1977	→	SSAP 14	September 1978	14 months
ED 21	Foreign Currency Transactions	September 1977	→	→	→	→
ED 22	Post Balance Sheet Events	February 1978	→	SSAP 17	August 1980	30 months
ED 23	Contingencies	November 1978	→	SSAP 18	August 1980	21 months
ED 24	See under ED 8	→	→	→	→	→
ED 25	See under ED 1	→	→	→	→	→
ED 26	See under ED 15	→	→	→	→	→
ED 27	See under ED 21	→	→	→	→	→

prior to a standard), accounting for price level changes (three exposure drafts, one deleted provisional standard and one full standard) and accounting for deferred taxation (the only topic to have produced two exposure drafts and *two full standards*). In each case significant pressure was exerted on the ASC to change the tenor of its original pronouncement. It is possible from press comments and written evidence to the ASC to identify particular self-interested groups who have actively engaged in attempts to influence the ASC's ultimate pronouncements. For instance pressure from the aerospace industry contributed to the ASC's change of heart on the treatment of research and development, from the complete expensing of all research and development expenditure advocated by ED14 to the possible capitalisation of development expenditure advocated by ED17 and implemented by SSAP13. Pressure from the large clearing banks contributed to the inclusion in ED24 of an adjustment to reflect the need to include monetary working capital in any definition of capital maintenance; and lobbying from, among others, investment property companies, against the necessity to depreciate buildings as advocated by ED15, led ultimately to the production of a second exposure draft (ED26) to deal specifically with the problems of such companies.

That such self-interested pressure exists is not surprising. Nor is it confined to the United Kingdom. It is endemic in accounting policy-making in all Western societies. The American FASB and its predecessor the Accounting Principles Board (APB) have both been subject to intense political lobbying over the years. For example, the pressure put on both the SEC and Congress by powerful interest groups led to turnabouts by the APB on accounting for the investment credit and on accounting for marketable securities; the FASB has also experienced more recent reverses on accounting for leases, accounting for oil and gas companies, and accounting for foreign currency translations.

The way in which the ASC has reacted to pressure by changing the whole tenor of particular exposure drafts and standards has produced much criticism⁵ of its approach to accounting policy making. In particular, critics have long argued that the standards issued to date by the ASC represent nothing more than a series of loose uncoordinated policy statements which lack any

degree of internal consistency, and which, when taken individually, appear to violate the fundamental accounting concepts of 'going concern', 'accruals', 'consistency' and 'prudence' laid down by SSAP2. For example, it can reasonably be argued that the treatment of research and development permitted by SSAP13 follows the 'accruals' rather than the 'prudence' concept, yet paragraph 14 of SSAP2 expressly provides that 'where the accruals concept is inconsistent with the "prudence" concept, the latter prevails'. (One might, however, advance the counter-argument that the concepts of SSAP2 may themselves be seen as being internally inconsistent, and therefore strict application of their precepts may be misleading.)

Further, and perhaps more importantly, it is frequently asserted that the ASC has failed to develop, or agree to develop, a theoretical framework for accounting which would allow prescriptive rules to fall out logically from the body of theory; rules which could then be used as a firm basis for the generation of accounting standards, and thus avoid the chopping and changing which currently exists. Whether such an overall perspective to accounting policy making is feasible,⁶ or indeed desirable, we will discuss later in this paper. For the moment, we turn our attention to the history of the debate which has surrounded the subject of deferred taxation for the past decade.

The history of the deferred taxation debate

The term 'deferred taxation' may not always have been used to describe the taxation attributable to differences arising because transactions are treated differently in computing accounting profit from their treatment in computing taxable profit. Indeed Recommendation N27 of the Institute of Chartered Accountants in England and Wales issued in 1968 used the term formally for the first time; prior to 1968 it was more usual to refer to 'taxation equalisation' accounts when describing these taxation balances. That recommendation followed the legal recognition by the 1967 Companies Act of the appropriation of such balances 'to prevent undue fluctuations in the charges for taxation'.

⁵See, for example, the comments received to the ASC's Consultative Document issued in September 1978.

⁶For one view of the applicability to policy-making of prescriptive theory, see Ross L. Watts and Jerold L. Zimmerman, 'The Demand for and Supply of Accounting Theories: The Market for Excuses', *Accounting Review*, April 1979, pp. 273-305, and also: Ross L. Watts and Jerold L. Zimmerman, 'Towards a Positive Theory of the Determinations of Accounting Standards', *Accounting Review*, January 1978, pp. 112-134.

The exact wording of Recommendation N27 is important because not only does it formally lay down the principle that deferred taxation should be provided but it also suggests how it should be measured. In paragraph 33(a) of N27 it is stated that 'a deferred taxation account should be established and maintained at *current rates of taxation* whenever there exist material taxation liabilities which may crystallise at some future date on profits and surpluses already brought into account'. The measurement method suggested by the use of the phrase 'maintained at current rates of taxation' is commonly known as the 'liability' method. Under the liability method, the tax effects of timing differences are regarded as amounts of tax ultimately payable by (or to) the company, i.e. they are liabilities (or prepayments). Therefore, deferred taxation balances are maintained at current rates of taxation as the best indicator of the amount of tax payable when the liability falls due for payment. The initial computations are considered to be merely tentative and are subject to future adjustments if tax rates change or if new taxes are imposed.

The liability method is not, however, the only method available for computing deferred taxation charges and balances. A more widely canvassed alternative to the liability method is the 'deferral method', which measures the historic benefit from postponing taxes. Under the deferral method, deferred taxes are determined on the basis of tax rates existing at the date at which the timing differences originate. Thus, deferred taxation balances are not classified as liabilities but rather as deferred revenue (or expenditure) accounts. As a consequence, any later changes in the rate of tax, or any change brought about by the imposition of new taxes, give no cause for adjustment to the balances.

The distinction between the two methods is, as we shall see, only of importance if tax rates change. If tax rates are stable, the distinction is in name only. Both measurement methods will then yield the same results.

When the Accounting Standards Committee was set up in 1969, the subject of deferred taxation appeared on its list of original topics for future consideration. Paragraph 13 of SSAP 2 'Disclosure of Accounting Policies' issued in 1971, listed deferred taxation as a significant matter for which different accounting bases (presumably the liability and deferral bases) are recognised, and which may have a material effect on reported results and financial position. The ICAEW's *Survey of Published Accounts* for 1971-72 shows that

249 of the 300 companies examined by the survey provided in full for deferred taxation, though no information is given as to the measurement method used.

The ASC's first exposure draft on deferred taxation (ED11) was issued in May 1973. ED11 recommended that deferred taxation should be accounted for on all material timing differences using the deferral method (i.e. it advocated full tax allocation). The reasons for choosing the deferral method were not specified in the exposure draft, but it is possible that the choice was influenced by at least two factors. Firstly, the deferral method had been, and still is, the required method in the USA since the issue of APB Opinion No. 11 in 1967, and, secondly, in 1971 the Accountants' International Study Group had recommended the deferral method as the most appropriate one for general use. (However, it should be pointed out that the liability method is currently used in Australia, New Zealand and The Netherlands.)

The publication of ED11 evoked 118 replies (see Table 1 for the breakdown by type of respondent). Support for its proposals was muted. The main criticism of the exposure draft was its insistence, without any supporting reasons, on the use of the deferral method. Many respondents, both industrial and professional, expressed concern at the lack of any option to use alternative methods, particularly as the liability method was the most widely used at the time. The argument concerning the imposition of the deferral method was intensified by the uncertainty over the possibility of future fluctuations in the statutory corporation tax rate following the introduction of the new imputation system of company taxation in 1973. This would mean, it was argued, that the choice of method could produce significantly different results. (It might be noted here that the problem of choice of method has assumed less importance over the past six years as the statutory corporation tax rate has remained stable at 52%.)

In August 1975, after much deliberation, the ASC translated ED11 into SSAP11, taking into account comments received on the exposure draft. The result was an accounting standard which insisted on comprehensive tax allocation, while at the same time permitting companies the freedom to choose either the liability or the deferral method to account for material timing differences.

The timing of the publication of SSAP11 was, however, far from conducive to its general acceptability. Factors beyond the control of the ASC contributed to a mounting opposition to the provisions of the standard. Full tax allocation was

viewed by industry as unacceptable, primarily because of the impact of a series of economic events which combined to produce a situation in which the actual tax rates experienced by the corporate sector were wildly different from the nominal tax rate. We might identify some of these events as:

- (i) the grant to companies of 100% first year allowances on qualifying expenditure, first given in 1972;
- (ii) the existence in 1974-75 of an annual rate of inflation which approached 30%; and
- (iii) the granting in 1974 of stock appreciation relief to companies which experienced increases in both the value and volume of inventories.

The total effect of these events was the creation of large deferred tax balances in company balance sheets.

Table 3 gives some indication of the impact of deferred taxation on balance sheet and profit and loss account amounts for all companies in the manufacturing and distribution industry for the relevant six-year period from 1971 to 1976. The data for the six years are not strictly comparable, due to, *inter alia*, changes in tax legislation resulting in 100% First Year Allowances in 1972 and Stock Appreciation Relief in 1974, and should, therefore, be viewed with caution. Nevertheless, some tentative comments on the figures can be made. Table 3 reveals deferred taxation as an increasing percentage of both corporate net assets and shareholders' funds. With a total balance sheet figure for deferred taxation of £7.6 billions in 1976, representing 21.6% of shareholders' funds, it is not surprising that alarm bells had

begun to ring in company boardrooms. Nor would a reading of corporate profit statements have offered more comfort. Table 3, lines 3 and 4 reveal both the steady erosion of reported after-tax corporate profits attributable to deferred taxation transfers, and the increasing proportion of the total tax charge taken up by deferred taxation.

Because Table 3 deals only with aggregate corporate figures, and therefore hides any differences which may exist between particular industries, Table 4 has been added to show how the reported figures of certain industries were affected by the existence of deferred taxation charges and balances in 1976. The particular industries have been chosen to represent a broad spectrum of UK industry. They account for approximately 50% of the total net assets employed by all companies in the manufacturing and distribution sector. Table 4 reveals the differential effects of deferred taxation; both the wholesale distribution industry, which had benefited enormously from stock appreciation relief, and the construction industry, which invests heavily in plant, and thus receives large first-year tax allowances, show deferred tax balances which, when expressed as percentages of both shareholders' funds and net assets, are significantly larger than the total industry percentage (see line 2 of Table 4).

In effect, the situation which existed in 1976 amounted virtually to the corporate sector having a makeshift inflation accounting system for taxation purposes, but an historic cost system for shareholder reporting. This prompted a discernible switch in emphasis in the entire deferred taxation discussion. No longer were the theoretical merits of the deferral and liability methods paramount, but rather the question 'How should deferred taxation be measured?' was superseded

Table 3

Significance of Deferred Taxation as Shown by Aggregate Corporate Figures for the Manufacturing and Distribution Industries

	1971	1972	1973	1974	1975	1976
<i>Balance Sheet</i>						
Deferred Taxation Balance (£m)	901	1388	2339	3987	5872	7620
(1) as % of Net Assets	3.2	4.3	6.3	9.6	12.6	14.2
(2) as % of Shareholders' Funds	4.4	6.1	9.1	14.1	19.1	21.6
<i>Profit and Loss Account</i>						
Deferred Taxation (£m)	197	357	575	964	1072	1687
(3) as % of Gross Income	3.3	5.3	6.9	11.1	11.8	13.8
(4) as % of Total Tax Charge	13.3	22.0	20.8	32.5	34.7	39.8

Source: *Business Monitor M3* (1978): Company Finance CSO.

Table 4
Significance of Deferred Tax as Shown by Selected Industrial Classification for 1976

<i>Industry</i>	<i>Total Industry Percentage (per Table 3)</i>	<i>Food</i>	<i>Drink</i>	<i>Chemicals</i>	<i>Construction</i>	<i>Electrical Engineering</i>
NUMBER OF COMPANIES		23	35	36	52	36
<i>Balance Sheet</i>						
Deferred Tax Balance (£m)		490	445	829	277	388
(1) as % of Net Assets	14.2	14.4	14.6	13.0	21.1	10.2
(2) as % of Shareholders' Funds	21.6	21.7	21.7	22.9	32.4	14.8
Profit and Loss Account						
Deferred Tax (£m)		87	115	222	65	100
(3) as % of Gross Income	13.8	9.6	20.2	14.7	19.0	10.2
(4) as % of Total Tax Charge	39.8	25.5	51.6	46.6	53.3	28.7
<i>Industry</i>	<i>Non-Electrical Engineering</i>	<i>Paper & Printing</i>	<i>Textiles</i>	<i>Retail Distribution</i>	<i>Wholesale Distribution</i>	
NUMBER OF COMPANIES	83	47	53	63	55	
<i>Balance Sheet</i>						
Deferred Tax Balance (£m)	282	254	180	549	155	
(1) as % of Net Assets	12.5	12.3	9.7	15.3	17.5	
(2) as % of Shareholders' Funds	16.9	20.3	14.5	20.7	27.9	
Profit and Loss Account						
Deferred Tax (£m)	58	53	28	133	52	
(3) as % of Gross Income	11.5	12.9	7.1	16.8	28.6	
(4) as % of Total Tax Charge	32.0	39.0	26.4	41.5	68.4	

Source: *Business Monitor M3* (1978); Company Finance CSO.

by the more urgent question: 'Should deferred taxation be provided at all, when there is little apparent likelihood that it will ever be repaid?'

One or two comments may help to amplify this switch of emphasis. Firstly, many leading industrialists felt in 1976 that the structure of investment incentives for capital spending had been deliberately created by the Government in order to confer a permanent tax advantage to certain manufacturing industries. Thus, they argued, it would be appropriate to recognise the reduction in the effective rate of corporation tax by writing off deferred taxation which was never intended to be collected, but had arisen purely because of the arbitrary use of a tax rate of 52%. Secondly, the CBI, who effectively coordinated the corporate opposition to SSAP11, suggested that full deferred tax accounting was inequitable to current shareholders and 'it [SSAP11] shows an unnecessary emphasis on mathematical symmetry, which results in serious distortions for the vast majority of companies... and results in a misleading after-tax return on the capital employed, which does not have a proper regard to commercial and economic realities'. The criticism of SSAP11 did not come solely from industry. The Committee of London Clearing Banks, the British Insurance Association and some large firms of chartered accountants, especially Price Waterhouse and Co., all advocated a change of direction by the ASC. The ASC eventually bowed to the pressure for change, postponed the intended implementation date of SSAP11, and promised a review of the standard.

Before the review was published, the ASC produced in November 1976 its response to the suggestions made in the Sandilands Report on Inflation Accounting, in the form of ED18 'Current Cost Accounting'. Paragraphs 244 to 257 of ED18 dealt specifically with deferred taxation. Paragraphs 244 and 249 are of particular interest, as they gave an indication of possible future developments concerning deferred taxation. Paragraph 244 states that

... it has been concluded that for current cost accounting under the present tax system, or under one where assessments are based more closely on current cost concepts, SSAP11 requires modification so as to give recognition to the substance of the allowances and reliefs... *broadly speaking provisions for deferred taxation should not be required where a future liability is not reasonably foreseeable.* (Our emphasis.)

Paragraph 249 states that

... it is appropriate that in the case of accelerated capital allowances, provision be made for deferred taxation *except in so far as the tax benefit can be expected with reasonable probability* to be retained in consequence of recurring timing differences of the same type. The *assessment of reasonable probability in these cases should be made in the light of the current intentions of the directors and of the company's expectations and plans for the future viewed in relation to the historical pattern of capital expenditure.* (Our emphasis.)

For the first time in the deferred taxation debate, expressions such as 'reasonable probability' and 'foreseeable future' were given official mention, even if only as part of an exposure draft which dealt only superficially with deferred taxation. (Note, however, that paragraph 6 of SSAP8, 'The Treatment of Taxation under the Imputation System in the Accounts of Companies', uses the term 'foreseeable future' in the very different context of the recoverability of advanced corporation tax.)

The influence of the thinking behind ED18 was immediately apparent in the revised suggestions for the treatment of deferred taxation. The review of SSAP11 promised by the ASC in 1976 resulted in the issue of a new exposure draft (ED19) in May 1977. ED19 reversed many of the provisions of SSAP11. Firstly, it recommended that timing differences which satisfied certain criteria need not be accounted for in company accounts. Secondly, it recommended that the *liability* method should be used to measure the taxation attributable to all timing differences other than those satisfying the prescribed criteria. Paragraph 21 of the exposure draft set out the new view of the ASC as follows: 'Deferred taxation should be accounted for, on the liability method, in respect of the tax reduction arising from all originating timing differences of material amount, other than any tax reduction which can be demonstrated with reasonable probability to continue for the foreseeable future.'

One hundred and fifteen responses were received by the ASC to ED19. Though individual companies⁷ raised some specific objections to the proposals contained in the exposure draft, 25 of the 29 *industrial* respondents were in broad agree-

⁷ For a more detailed exposition of the comments made by industry to ED19, see John Briggs and Tony Hope, 'An Empirical Analysis of the Deferred Tax Problem: Some Comments on Corporate Choice', forthcoming.

ment. (The observation that there were 33% fewer industrial respondents to ED19 than to its predecessor, ED11, might give some support to the view that industry was generally more favourable towards the provisions of ED19.) Only one company, Unilever Ltd., argued for comprehensive tax allocation, attacking the exposure draft on the grounds that it lacked any conceptual basis.

Twenty-six professional accounting firms replied to the exposure draft. Some of their comments are worth repeating here, as they represent, in microcosm, an example of the varying viewpoints which the ASC must consider in its entire programme of accounting standard setting. Generally speaking, the large professional firms either supported ED19 on the grounds that it represented a realistic practical approach to the deferred tax problem (Price Waterhouse & Co., Coopers & Lybrand and Touche Ross & Co. fell into this category), or they disagreed strongly on the grounds that the exposure draft was unsound as it traded off theoretical rigour for pure expediency (Arthur Andersen & Co., Arthur Young McClelland Moores (AYMM), Deloitte, Haskins & Sells, and Pannell Fitzpatrick all expressed this view). These latter firms suggested that SSAP11 should be retained. Indeed, Arthur Andersen & Co., in its formal response to ED19, felt sufficiently strongly to remark that '...we believe that the integrity of the ASC can only be preserved by its public recognition that the standard now proposed is based upon a practical response to the issues rather than a supportable conceptual solution.'

More specifically, the criticisms cited in paragraph 2 of the detailed response to ED19 made by AYMM are echoed by many other firms. These criticisms, in relation to the 'reasonable probability' solution proposed in ED19, are:

- (i) that the solution departs from existing concepts, particularly the *matching* and *prudence* concepts;
- (ii) that it will in practice prove too subjective and open to abuse;
- (iii) that it encourages the over-distribution of profit by failing to provide for the maintenance of capital.

AYMM claimed that 'ED19 proposes a system of quasi-cash accounting using forecasts of future events and intentions'. A similar position was adopted by Deloitte Haskins & Sells. In their submission to ED19, they state that they '...con-

sider it both undesirable and illogical that the criterion that is used in measuring companies' profit should vary with the degree of sophistication that is embodied in their forecasting procedures'.

Other accounting firms concurred with AYMM that the degree of subjectivity inherent in the ED19 approach was inconsistent with a basic *raison d'être* of the ASC—the standardisation and comparability of accounts. Spicer and Pegler, for example, argued that the approach adopted by ED19 'placed in danger the entire objectives of accounting standards'. (Although Spicer and Pegler did not tell the ASC what they understand the objectives of accounting standards to be!)

Each of the respondent firms made some reference to the audit problems presented by ED19. AYMM suggested that '...the determination of the amount [of deferred taxation] will cause considerable difficulties. It will be necessary to prepare and review forecasts of profits, cash, capital expenditure and stocks for some years ahead and, apart from the normal "internal" assumptions, management and auditors must predict events which are outside the company's control'. Arthur Andersen & Co maintained that in their view '...such terms as "intentions", "expectations" and "historical pattern" cannot provide a sound basis on which to determine the reporting of deferred taxes...an assessment of "reasonable probability" can only be made where (1) an operating forecast exists...(2) the forecast demonstrates by period that capital expenditure and stock levels will be maintained at a sufficient level...and (3) evidence to support the company's ability to finance the expenditures...'

The professional firms, however, appear also to have had a salutary recognition of the extent of their likely influence on the deferred taxation outcome. Such recognition is best encapsulated by the final paragraph of Deloitte Haskins & Sells' submission on ED19, in which they state that 'we believe that the course of action in 1. above [retention of SSAP11] is conceptually more sound. *However, because accountants in industrial companies have rejected the proposals in SSAP11 we recognise that the ASC may decide it cannot adopt that course of action*'. (Emphasis added.)

After an exposure period of 15 months, the ASC in October 1978 withdrew SSAP11 and substituted SSAP15 in its stead. All of the more controversial provisions of ED19 were retained, but the phrases 'reasonable probability' and 'foreseeable future' were clarified. For instance, paragraph 28 of the new standard deals with the clarification of 'foreseeable future' as follows:

It will be reasonable to assume that timing difficulties will not reverse and tax liabilities will therefore not crystallise if, but only if, the company is a going concern and:

- (a) the directors are able to foresee on reasonable evidence that no liability is likely to arise as a result of reversal of timing differences for some considerable period (at least three years) ahead; and
- (b) there is no indication that after this period the situation is likely to change so as to crystallise the liabilities.

Paragraph 29 refers to 'reasonable probability' indirectly as follows:

Where the criteria in paragraph 28 are satisfied, it will be reasonable to assume that the period which can be foreseen sets the pattern for the indefinite future... the position should be reviewed each year and regard should be had to the past pattern of capital expenditure and stock levels and whether forecasts made in the past have proved to be reliable.

SSAP15 also requires the disclosure, *by way of a note*, of the potential amount of deferred tax for all timing differences. Therefore, companies will still need to compute the full amount of all potential liabilities, even though provision within the main body of the accounts will not always be necessary. However, after many years of fierce debate on the computational aspects of deferred taxation, there is a lack of guidance from within SSAP15 itself as to how the amount to be shown by way of a note is to be determined. Nowhere in the standard are the 'liability' and 'deferral' methods even mentioned. It is necessary to look to Technical Release 311 published by the ASC simultaneously with SSAP15 to understand the reason for this. In paragraph 25 of TR311 the ASC states that 'ED19 proposed that the liability method should be used to calculate the deferred tax provision. ASC recognises that for most companies the liability method of calculation will be appropriate. For some companies which need to provide fully for deferred tax on all or a given class of assets the deferral method may be equally or more convenient. SSAP15 does not therefore interfere with the freedom to choose the appropriate method for calculating deferred tax balances.' This lack of interference may well say a great deal about the ASC's (new) view of its standard setting role; in particular, of its belief that

the UK standard setting process should not be viewed in isolation from such processes elsewhere in the world. If, for example, the ASC had *out-lawed* the deferral method, which is the required method in the USA, then it could be argued that many large UK companies would be faced with great international compliance difficulties. Furthermore, recent cooperation between the ASC, the FASB and the International Accountants Standards Committee (IASC) on the issue of foreign currency translation, suggests that this wider view of standard setting prevails in other areas.

Some implications for accounting standard setting

This description of the deferred taxation debate illustrates how problems can arise in the formulation of acceptable accounting policy when influential professional and business opinion is at variance with the proposed accounting treatment. Deferred taxation is, however, by no means the sole topic which has created difficulties for the ASC; proposals for, *inter alia*, the treatment of inflation, foreign currency translations, leasing, pensions, research and development, and depreciation have also provoked vehement responses resulting in substantial amendments and delays to policy statements. Is there anything to be learned from these histories which may act as an aid to future policy making? Is the obvious cognisance which the ASC takes of the prevailing business opinion the right course to adopt in formulating accounting standards?

One frequent suggestion for the future improvement of accounting policy making which stems directly from the difficulties experienced by the ASC, is that some underlying theoretical structure is urgently needed to provide a basis for accounting policy decisions. In other words, a major criticism of the ASC is the lack of concern it has displayed towards the development of an underlying theory or 'conceptual framework' of accounting.⁸ This criticism has not, however, been lost on the ASC. In paragraph 1.8 of its 1978 consultative document *Setting Accounting Standards* it publicly recognises that 'the ASC has been said to lack consistency because it has failed to develop an agreed conceptual framework from which to build a logical series of SSAPs'. Question 7.2 in the

⁸See again, the comments to the ASC's consultative document—especially to Question 7:2 of the document.

appendix to the same document asks 'Should the ASC encourage research into the possibility of finding an acceptable "model" (conceptual framework)?' Indeed, the ASC commissioned a report by Professor Macve in 1979 into the feasibility of developing such a framework. The presupposition underlying this question is presumably that the development of a conceptual framework might provide a workable basis for generating standards. This is certainly a view which is strongly subscribed to by the FASB, which has invested much time, money and effort into the development of such a framework as an important step in the determination of best accounting practice.

The thesis underlying the conceptual framework approach is that the problems of accounting will be best solved if attempts are made to understand the predicted consequences of alternative actions in order to ensure that the action which is ultimately taken is consistent with the specified objective. It might be termed a 'scientific' or 'rational' approach. It stresses the importance of 'a priori' analysis and, ultimately, empirical validation. It is not a new approach, nor is it unknown to accounting policy makers. There have been at least three recent attempts by the accounting profession in the USA,⁹ and one in the United Kingdom,¹⁰ to develop a framework for accounting based, in some measure, on the rational approach. None has met with immediate success. This may seem somewhat surprising, because the approach itself is intuitively appealing, at least in the sense that a consideration of *explicit* objectives would appear to be a logical and necessary first step to the determination of best accounting practice.

But how likely is it that a conceptual framework will offer a foundation on which 'to build a logical series of SSAPs'? How likely is it that the policy problems of deferred taxation would have been minimised by reference to a conceptual framework? The answer to this question depends in large measure on what one understands by a 'conceptual framework' of accounting, and what cognisance one believes such a framework should take of the social and political environment in

which accounting operates. Unfortunately, one cannot easily answer the question because nowhere in the Consultative Document does the ASC state what meaning it attributes to the term 'conceptual framework'. For instance, does the ASC view the search for a conceptual framework as being equivalent to the search for true figures of wealth and income? (If so, to whom must these economic truths be acceptable for the framework itself to be acceptable?) Or does the ASC view the search as entailing the recognition that possible conflicts of interest may exist among those affected by the accounting information which should somehow be accommodated into any overall framework of accounting?

If the ASC sees the search for a conceptual framework as a search for the 'correct' accounting rules to generate economic truths, is it likely that such a framework will provide a clear and consistent basis for making unambiguous policy choices? It is very doubtful. The reason why such a framework will likely prove to be a practical disappointment is provided by an appreciation of the issues which gave rise to the deferred taxation debate. In other words, the issues which prompted the about-turn from SSAP11 to SSAP15 were brought on by a conflict of goals of the influential parties in the policy making process, in this case the preparers of accounts (corporate management), the auditors of accounts (professional accounting firms) and the policy making body itself (the Accounting Standards Committee). Phrased differently, we might say that the issues were not simply technical issues concerning the measurement (or non-measurement) of deferred taxation; issues perhaps amenable to solution by reference to some underlying technical framework of accounting. Rather the primary issues were largely pragmatic or 'political', capable of resolution only by reference to some underlying theory of accounting which incorporates a recognition of the *political* process which generates policy statements.

This line of thinking suggests that there is a further reason for doubting the extent of the possible contribution to accounting policy decision to be derived from any accounting framework, which excludes a recognition of the existence of 'political' pressure. It is that, unless the policy making body has valid reasons to assume that the goals of influential participants in the policy making process are congruent (and evidence from the deferred taxation issue suggests that this may be an invalid assumption), and therefore that a 'technical' resolution of the problems of accounting is

⁹For example see: M. Moonitz and R. T. Sproule, Accounting Research Study No. 3, *A Tentative Set of Broad Accounting Principles for Business Enterprises*, New York, AICPA, 1962. M. Moonitz, Accounting Research Study No. 1, *The Basic Postulates of Accounting*, New York, AICPA, 1961, and Report of the Study Group on the Objectives of Financial Statements, *Objectives of Financial Statements*, New York, AICPA, 1973.

¹⁰Accounting Standards Committee, *The Corporate Report*, London, ICAEW, 1975.

feasible, it is anachronistic to expect the ASC to be able to carry through an approach to standard setting which, by its very nature, may be viewed as narrow, authoritarian and non-democratic. In a democracy, only politically responsive institutions have the right to command others to obey. Writing in an American context, Rappaport¹¹ expresses the view that '...the adoption ... of a framework from which all standards will naturally evolve may well cause corporate executives, investors and other interested parties to view [the FASB] as being unresponsive to their concerns...this could lead to the demise of meaningful private sector involvement in establishing accounting standards.' This problem has been explicitly recognised at the policy making level by the Dutch. Commenting on the standard setting procedure in the Netherlands, Muis¹² writes that '...the formulation of standards is not carried out in the traditional autocratic way, by accountants only or by academics who, often on a speculative basis decide what information users ask for or should ask for.... The Dutch who argued for a long time that standards without theory are useless, and, in consequence rejected standard setting, have now come to realise that theory without standards has no substance, and the work has begun.'

If this line of reasoning is accepted, and excessive hopes for an approach which seeks to find 'economic truths' are unlikely to be rewarded, accounting policy makers will be faced with a predictable dilemma—the sort of dilemma currently facing the ASC. On the one hand it is unlikely that significant progress will be achieved by strict adherence to a technically ideal but politically unacceptable framework; on the other hand it is equally unlikely that the social legitimacy of the policy making body will be enhanced either by the promulgation of bland, innocuous policy statements which offend no one, or by the issue of standards which self-evidently pander to the powerful.

What is needed is a policy making strategy which explicitly recognises the limitations of any theory to generate unambiguous policy choices and which therefore sees the role of a conceptual framework purely as one of offering very general guidance, rather than attempting to provide defi-

nitive solutions to accounting problems. As the survival of the policy making body must rest ultimately on *public confidence* in its standard-setting procedures, a process is needed which is seen to be open and fair by interested groups—i.e. by representatives of wider sectors of society such as Union leaders and Members of Parliament, as well as by representatives of the more directly involved preparers, auditors and users of accounts.

If it is accepted that the consequences of accounting policy decisions are potentially far-reaching, then there is no obvious reason to assume that accountants with their (necessarily) limited range of expertise, rather than knowledgeable representatives from other groups within society, should control the accounting policy process. (The composition of the 12 member Sandilands Committee which drew on representatives from the fields of accounting, law, economics, banking and trades unionism certainly reflected the view that the determination of a policy on inflation accounting, with its potentially wide ramifications for both users and non-users of accounts, should not be left to the accounting profession alone!)

We therefore believe that to achieve a higher level of public confidence in the standard setting function, the range of expertise should be widened. This suggests to us that the determination of accounting policy should be somewhat differentiated from the drafting of exposure drafts and accounting standards. More specifically, we believe that the current functions of the ASC should be administered by two permanent boards: a policy review board, and an accounting standards board.

The policy review board should have overall control of the standard-setting process, and should be composed of individuals from different backgrounds and possessing different interests, perhaps on the lines of the Sandilands Committee. This board would act as a sort of consumers' council, or watchdog. It would replace the existing *ad hoc* Consultative Group of the ASC, which has no formal control over the procedures of the ASC. It would have the task of stating that all its policy statements (accounting standards) are intended to be 'in the public interest.' It is evident from recent history, both in the UK and the USA, that policy decisions which are not deemed to be in the public interest can be reversed by a higher authority. For example, the UK government, which one must presume to apply a criterion of maximising social welfare,

¹¹A. Rappaport, 'Economic Impact of Accounting Standards—Implications for the FASB', *Journal of Accountancy*, May 1977, pp. 89–98.

¹²J. Muis, 'Accounting Standard Setting: The Pith and the Pendulum', *Accounting and Business Research*, Autumn 1977, pp. 291–4.

intervened in the 'inflation accounting debate' via the setting up of the Sandilands Committee, when it appeared (to the government) that the policy making body (the ASC) was not acting in the public interest in pursuing a current purchasing power approach as the solution to the problems of price level accounting.

To enhance the openness of the process, the policy review board should explain *how* and *why* issues are accepted for Exposure Draft status and how priorities are assigned to particular areas. This would help to alleviate any possible fears of 'manipulation of the agenda' by interested parties. The policy board should also state what it understands by a 'conceptual framework' for accounting and what it sees to be the advantages of attaining such a framework.

At a more junior level, an accounting standards board would be charged with the task of develop-

ing exposure drafts and accounting standards for final approval by the policy review board. Because of the technical complexities involved in the drafting and interpretation of such documents, this board should be composed of accountants. The accounting standards board would, therefore, undertake most of the day-to-day duties currently performed by the ASC—i.e. it would be concerned with research commissions, drafting sub-committees, internal exposures, meetings with interested parties, publications for general comment, evaluation of comments and preparation of the ultimate standards.

We believe these changes would not be simply cosmetic. Rather they would represent a positive and visible contribution towards the achievement of openness and fairness in policy making—criteria which have not always been evident in the ASC's pronouncements.

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A New Proposal for Setting Intra-Company Transfer Prices

R. Manes and R. Verrecchia

Firms are organised into profit centres for a variety of reasons. Some decentralise their operations from a conviction that the freedom to make decisions will motivate lower levels of management to greater efforts and that the incentives to these subunits to act swiftly, aggressively, and independently on current information outweigh any advantages of a more deliberate and ponderous central headquarters planning system. On the other hand, many divisionalised systems grow willy nilly, and may be kept as such for a wide range of institutional reasons. These include (1) international or geographical boundaries, (2) historical combinations and acquisitions in which separate corporate structures are maintained as the most convenient way to carry over existing management, markets etc., (3) the existence of minority interests in consolidated firms, (4) regulatory commission rulings, (5) joint ventures and others.

For whatever reason decentralisation takes place or persists, it requires that the management of each profit centre select suppliers, sell to whatever markets it chooses and determine the prices at which it transfers or sells its products. This last requirement, called the transfer pricing problem, has given rise to an extensive literature, in which several ways have been proposed for setting the prices of intermediate products transferred within the firm.¹ These ways include systems based on:

- (1) Market prices.
- (2) Marginal costs (or variable costs when the cost function is not understood well enough to determine marginal costs).
- (3) Average costs plus a 'reasonable' profit or full-cost 'plus', either actual or standard.
- (4) Opportunity costs or shadow prices.²
- (5) Negotiated prices, for which negotiations might be initiated from any of the previous points of departure.³

The more doctrinaire advocates of corporate decentralisation and of a laissez-faire policy towards profit centres will argue that there is truly no transfer pricing issue and that only a market price approach can be considered since any other dictated policy by definition denies the freedom needed for a profit centre to exist. A corollary of this argument is that organisations should only be divided into profit centres for which there are readily defined and separate product markets. And in general, there is little quarrel on the part of economists or of accountants that when competitive market prices do exist, these prices, adequately adjusted for internal economies of the integrated firm,⁴ should be the prices used to calculate divisional profits. Difficulties arise, however, whenever there is no clear

¹A selective list of references on the subject must start with reference to management science and economic literature on the subject such as: J. Hirshliefer, 'On the Economics of Transfer Pricing,' *Journal of Business*, Vol. 29, 1956 and 'Economics of the Divisionalized Firm,' *Journal of Business*, Vol. 30, 1957; M. Shubik, 'Incentives, Decentralized Control, the Assignment of Joint Costs and Transfer Pricing,' *Management Science*, Vol. 8, 1962; and W. J. Baumol and T. Fabian, 'Decomposition, Pricing for Decentralization and External Economies,' *Management Science*, Sept. 1964, pp. 1-31. Among earlier papers in accounting on the subject, refer to H. Bierman, Jr., 'Pricing Intracompany Transfers,' *Accounting Review*, July 1959; D. Solomons, *Divisional Performance: Measurement and Control*, R. D. Irwin, Inc., 1965, Chap. 6 & Appendix A; N. Dopuch and D. Drake, 'Accounting Implications of a Mathematical Programming Approach to the Transfer Price

Problem,' *Journal of Accounting Research*, Spring 1964; J. Ronen and G. McKinney III, 'Transfer Pricing for Divisional Autonomy,' *Journal of Accounting Research*, Spring 1970; R. Abdel-Khalik and E. Lusk, 'Transfer Pricing: A Synthesis,' *Accounting Review*, January 1974, pp. 8-23, Watson, D. J. H. and Baumler, J. V. 'Transfer Pricing: A Behavioral Context,' *Accounting Review*, July 1975 and C. R. Emmanuel, 'The Birch Paper Co: A Possible Solution to the Interdivisional Problem,' *Accountant's Magazine*, May 1977, pp. 196-198.

²M. Onsi, 'A Transfer Pricing System Based on Opportunity Cost,' *Accounting Review*, July 1970, pp. 535-43 and R. Manes, 'Birch Paper Company Revisited: An Exercise in Transfer Pricing,' *Accounting Review*, July 1970, pp. 640-43.

³G. Shillinglaw, *Managerial Cost Accounting*, 4th Ed., R. D. Irwin, Inc., 1977, Chap. 26.

⁴P. W. Cook, Jr., 'Decentralization and the Transfer Price Problem,' *Journal of Business*, Vol. 27, 1955 and J. R. Gould, 'Internal Pricing in Firms When There Are Costs of Using an Outside Market,' *Journal of Business*, January 1964.

market price for an intermediate product or service and the integrated firm elects (or is required) to treat as separate profit centres its several divisions exchanging the intermediate product. In such situations, top management may wish to retain an important role in future planning and pricing policy and at the same time to create an environment of profit centre management.

For such a combined purpose and for such circumstances (which we believe to be common in industry), the paper will examine a method of establishing transfer prices based on two allocation schemes, the Massachusetts formula (MF) and a Shapley value adjusted MF. The process initially requires the firm to develop a centralised, coordinated production schedule and profit plan for all interlocking activities; and to that extent, the firm is an integrated rather than a decentralised one. Once the central plan and its consequent profit are conceived, i.e. after the optimal schedule of production is selected, then the MF or Shapley value MF is used to distribute the profit of the joint activities of its participating divisions according to an agreed upon weighting of factors of profitability. The Massachusetts formula is a concept adopted from the field of public finance taxation. This approach, widely used in the computation of US state corporation income and franchise taxes, has grown out of the efforts of the states to take into account the complex causality of income in a federal system which permits corporations to domicile in whatever state they choose while engaging in productive operations and the marketing of their goods wherever else they choose. The Shapley value was originally proposed in game theory as a formula for distributing the payoff of an n person game in a manner acceptable to the game's participants.⁵ It was subsequently advanced as a way for separate governmental units to share in the economies of scale of a joint public goods venture;⁶ and most recently it has appeared in the management accounting literature as a procedure for participating individuals (firms) to share in the savings or profits of any of a number of collaborative ventures.⁷ In both the public finance goods and in

the accounting case, savings or gains are treated analogously to the payoff of game and in this paper the overall profits of transferred products will be allocated by the Shapley formula.

Subsequent to the distribution of budgets and profit to divisions either by MF or Shapley value adjusted MF, transfer prices are calculated which will apportion these profits as agreed on. The approach taken in setting prices is a form of variable costs pricing 'plus', in which the plus consists in a share of the firm's budgeted contribution margin. The transfer prices are generated as part of a distributive process which is based on but comes after the profit planning stage and thus they are neutral with respect to decision making.

The allocation of profit to divisions that results from either of these two techniques is a negotiated one only to the extent that those managerial factors most relevant to firm profit must first be agreed upon. Once reached, such an agreement eliminates periodic bargaining on transfer prices and embodies certain properties of equity that are suggested by the causality of profit and by the Shapley value.

Illustration of the procedures

The procedure can perhaps best be explained by a numerical example. The steps of the example will involve:

- (1) Choice of a profit plan and development of a projected income statement.
- (2) Collection of other data used in the two profit distribution procedures.
- (3) Attribution of profits to individual departments by the Massachusetts formula (MF) or by the Shapley value adjusted MF.
- (4) Calculation of transfer prices to implement step (3).

Step 1: The Plan & Pro Forma Income Statement

Although any plan whatsoever would fulfil the needs of the illustration, we shall assume a firm with a centralised planning body which uses a

⁵Shapley, L. S., 'A Value of N-person Games,' in H. W. Kuhn and A. W. Tucker, eds. *Contributions to the Theory of Games*, 1953, pp. 305-317.

⁶E. T. Loehman and A. B. Winston, 'A New Theory of Pricing and Decision Making in Public Investment,' *Bell Journal of Economics and Management Science*, Autumn 1971, pp. 606-628.

⁷The most specific instructions are to be found in D. Jensen, 'A Class of Mutually Satisfactory Allocations,' *Accounting Review*, Oct. 1977, pp. 842-856, S. S. Hamlen, W. A. Hamlen and J. T. Tschirhart, 'The Use of Core Theory in Evaluating

Joint Cost Allocation Schemes,' *Accounting Review*, July 1977, pp. 616-627 and S. S. Hamlen, W. A. Hamlen, and J. T. Tschirhart, 'The Use of the Generalized Shapley Allocation in Joint Cost Allocation,' *Accounting Review*, April 1980, pp. 269-287. See also J. L. Callen, 'Financial Cost Allocation: A Game Theoretic Approach,' *Accounting Review*, April 1978, pp. 303-308.

mathematical programming model to generate its forthcoming production schedule, specifically:

$$\begin{aligned} \text{Max Profit} &= 2x_1 + 4x_2 + 5.5x_3 + 8x_4 \\ \text{S.t (1)} \quad &x_1 + x_2 + 1.2x_3 + 2x_4 \leq 250 \\ (2) \quad &x_2 + 1.5x_3 + 2x_4 \leq 200 \\ (3) \quad &x_3 + 1.5x_4 \leq 150 \end{aligned}$$

and all x 's ≥ 0 .

Assume that there are three major divisions in the firm and that constraints numbers 1 to 3 represent the respective capacity limits of the 3 divisions. Product one, x_1 , is a processed raw

material which is sold by Division 1 at a competitive market price. Product x_2 is the same raw material processed more intensely by Division 1, further worked on by Division 2 into a semi-finished good and sold to manufacturers at a competitive market price. Products 3 and 4 are manufactured goods, started in Division 1, processed specially there and in Division 2 and finished and marketed by Division 3; x_3 is a low cost good and x_4 is a higher quality, more carefully finished version of x_3 . Graph 1 shows the flow of products through the firm as modelled in the l.p. program:

Graph 1

Product Flow by Divisions of Shapley Co.

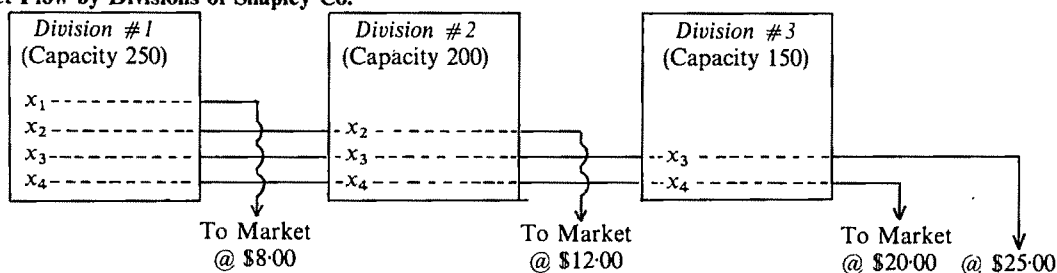


Table 1 shows the linear programming c_j 's or contribution margins of the firm's activities in terms of final product prices and variable costs per unit of each product as incurred in each successive department.

Table 1

Prices and Variable Costs of x_j 's

	x_1	x_2	x_3	x_4
P_j	\$8.00	\$12.00	\$20.00	\$25.00
Variable Cost Div 1	6.00	5.50	3.50	4.00
Variable Cost Div 2	---	2.50	7.00	8.50
Variable Cost Div 3	---	---	4.00	4.50
Total Variable Cost	6.00	8.00	14.50	17.00
Contribution Margin	2.00	4.00	5.50	8.00

The solution of the l.p. problem which will be the basis of the firm's profit plan is:

Profit \$913.33

Activity Levels

$x_1 = 90$ units

$x_3 = 133 \frac{1}{3}$ units

$x_7 = 16 \frac{2}{3}$ units [capacity slack in Div. 3]

The contribution margin portion of a pro forma, consolidated income statement can now be prepared for the firm's budgeted operations:

Pro Forma Income Statement, Shapley Co.
1981 Budget Year

<i>Sales Revenue</i>	x_1		x_3	<i>Total</i>
(90 × \$8)	\$720.00	(133 1/3 × \$20)	\$2666.66	\$3386.66
<i>Less Cost of</i>				
<i>Goods Sold:</i>				
Division 1 }	540.00		466.67	1006.67
2 }	—		933.33	933.33
3 }	—		533.33	533.33
Subtotal	540.00		1933.33	2473.33
Contribution Margin				
(Gross Profit)	\$180.00		\$733.33	\$913.33

The above statement covers income from all operations, and we shall later have to restrict it to reflect only operations transferring goods intra company (in this simplified case, to x_3), but before we make this adjustment, let us take up Step 2.

the 'Massachusetts Formula' (MF) has been developed and applied to corporate income taxes⁸ as follows:

Total Tax = [Total Corporate Income] × [Tax rate] × [Apportionment Ratio] where the Apportionment Ratio =

$$\frac{1}{3} \left\{ \frac{\text{In State Capital}}{\text{Total Nation or Worldwide Capital Assets of the Firm}} + \frac{\text{In State Payroll}}{\text{Total Payroll}} + \frac{\text{In State Sales}}{\text{Total Sales}} \right\}$$

Step 2: Data Used in the Profit Allocation Processes

Budgeted gross profit from the production and sale of x_3 is now known, i.e. \$733.33. The question which arises next is: to what extent was each division responsible for this profit? More fundamentally, we can ask, is this return due to the productivity of capital or that of labour? and should any of it devolve to the division which sells the product, as that marketing division's commission, or due? Such speculation could lead across disciplinary boundaries into theories of distribution which have concerned economists at least since the early nineteenth century but we will resist the temptation to digress.

Taxing authorities in the United States have been forced into the same kind of consideration for strictly non-theoretical reasons. In their assessment of the income of corporations that, for example, extract a raw material from one state, process it in a second, assemble it into a final product in a third and sell that product in several others, they have been obliged to decide how the state should measure the causality of overall income so as to be able to tax that portion attributable to activities occurring within its own boundaries. The most popular approach to this question has been to view capital, labour and the selling function as equal factors in causing profit and a formula resulting from this view, known as

As a similar application of this thinking, we suggest that profit can be attributed to each division in proportion to (1) its capital intensity, (2) the size of its payroll, and (3) its responsibility for sales. In Table 2, data for this attribution are collected and presented to complete the information needed for the illustration.

Total Assets could be the net balance of fixed assets, a value which contributes to income but is not represented by variable costs. However, because working capital also contributes to activity profits at possibly varying rates, total assets are probably better represented by the average of opening and closing balances of the debit side of the profit centre's balance sheet. The payroll row can be expressed either in terms of dollars or in terms of numbers of employees. More often than not, the MF uses monetary data (as shown above) which include not only the costs of direct labour embodied in the c_j 's but also the costs of supervision, and marketing and administrative personnel of the divisions. As such, each payroll represents the responsibility of a division's manage-

⁸O. Oldman and F. P. Schoettle, *State and Local Taxes and Finance*, The Foundation Press, 1974, Chapter 5, pp. 550-586. Twenty six states use the three factor formula described in the text to assess state corporation income and franchise taxes. Another ten or more states use variations on the three-factor 'Massachusetts formula' in an attempt to exact revenue from corporations which, for example, avoid doing business in a state by setting up only a sales outlet in that state, or avoid having income in a state by transferring manufactured goods out of its factories in the state at cost.

Table 2
Profit Factors in the Shapley Co's 1981 Budget Income

Profit Factors	Division 1	Division 2	Division 3	Total Firm
Assets	\$1550	\$2000	\$1200	\$4750
Payroll	\$300	\$500	\$300	\$1100
Sales	\$720	—	\$2666.67	\$3386.67

Table 2 (Revised)
Profit Factors for 1981 Income Adjusted to Eliminate Effects of Independent Market Transactions

Profit Factors	Division 1	Division 2	Division 3	Total
Assets	\$1000	\$2000	\$1200	\$4200
Payroll	\$200	\$500	\$300	\$1000
Sales	0	0	\$2667	\$2667

ment for the direction of its own personnel, for training of that personnel, for union relationships and even community responsibilities related to employees. Finally, sales are the totals of ultimate deliveries by the firm to outside firms at market prices. Specifically the sales values that are given in Table 2 are those from the Shapley Co.'s Pro Forma Income Statement.

Since we wish to allocate the gross profit from those activities in which the divisions of the firms have acted in concert, we must now eliminate the effect of independent operations from the pro forma income statement and from Table 2. In this case the only independent operation of the firm to be eliminated is x_1 , which is produced and sold entirely by Division 1. The remaining profit to be distributed is thus that which results from the production and sale of x_3 . Table 2 is therefore reconstructed to eliminate (1) the sales of x_1 , (2) the payroll costs from Division 1 needed to produce x_1 (in practice these costs would be known exactly, but for the problem they were approximated to be 90/250 of Divisional Labour Costs) and (3) that proportion of fixed assets committed

to x_1 . This last elimination is admittedly the most arbitrary and speculative of the adjustment steps taken and involves deleting from Table 2 that part of assets devoted to x_1 (again estimated to be 90/250 of Division 1's asset balance).

Step 3: Attribution of Profit to Divisions

The profit of \$733 could, of course, be allocated to Divisions 1, 2, and 3 as a proration of variable costs. The previous discussion of profit factors included the investment in assets and the marketing of products as important functions contributing to profit. Since neither of these functions is represented significantly by variable costs, this approach can be rejected as too simple and quite unsatisfactory.

The first approach to be taken seriously is also a relatively simple one, but one which firms might ultimately choose to adopt. It involves the straightforward application of the Massachusetts formula to profit. Using data from Step 2, we calculate that allocation as follows as in Table 3.

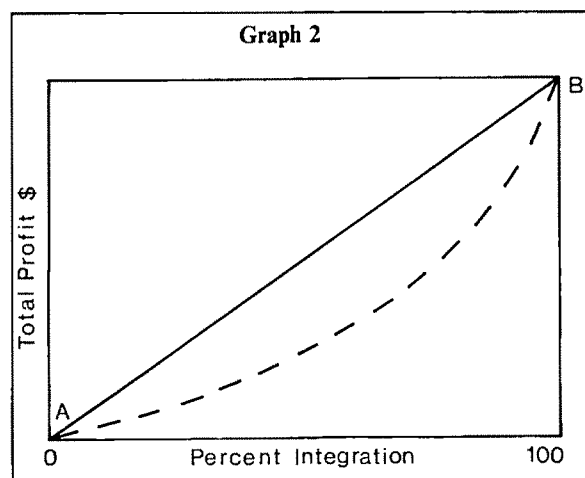
The second approach is computationally and conceptually a much more complicated one. It is based on the argument that the internal economies of integration depend on the degree or extent of integration and that they are increasing with respect to a complete coordination of activities, i.e. they are synergistic; and that total profit grows at an increasing rate when the firm has operational and strategic control over more and more of the inputs into its operations. Efficiency and profitability as functions of the size of the firm were extensively discussed by early twentieth century economists. Alfred Marshall made organisation one of the major agents of production.⁹ Subsequently, noted economists such as F. H. Knight and R. Coase explained vertical integration as a reasonable result of inter-divisional economies, a hypothesis extended more recently

⁹A. Marshall, *Principle of Economics*, 8th Edition, Book IV, Chapters VIII to XII.

Table 3
Massachusetts Formula Profit Allocation

		Profit Factor Apportionment Ratio	Profit Allocation
Division 1	$1/3$	$\left\{ \frac{1000}{4200} + \frac{200}{1000} + \frac{0}{2667} \right\} = 0.146$	$\times \$733 = \107.00
2	$1/3$	$\left\{ \frac{2000}{4200} + \frac{500}{1000} + \frac{0}{2667} \right\} = 0.325$	$\times \$733 = 238.00$
2	$1/3$	$\left\{ \frac{1200}{4200} + \frac{300}{1000} + \frac{2667}{2667} \right\} = 0.529$	$\times \$733 = \frac{388.00}{\$733.00}$

by Silver and Auster and by Alchian and Demsetz.¹⁰ Graph 2 attempts to illustrate this concept on a two dimensional scale.



This relationship is represented by the dotted line between points A and B which indicates that as a greater and greater proportion of the diverse operations of the firm are integrated an increasingly larger amount of the total final profit is achieved.¹¹ On the other hand, a straight line relationship between percentage integration and profit (A to B) would suggest that profit grows linearly as integrated control increases (represented by a straight line). If we allocate profit on the basis of variable cost of goods sold, these costs can be made a proxy to degree of integration and we can allocate on the straight line between A and B. Likewise if we use the MF, a linear combination of three factors, we are also allocating profit to divisions along a linear plane.

However, if we accept the hypothesis that profit accrues non-linearly to an integrated activity, the question of how to distribute that profit arises. Obviously if we move up the dotted profit line by division in the order that production takes place, the last division in the production line will receive a proportionally greater share of profit. Many transfer pricing schemes in fact do tend to ac-

cumulate profit for the selling division to the dissatisfaction of the profit centres which processed the product earlier. It was as a resolution of this kind of problem that Shapley proposed his formula. Adjusting an MF allocation by the Shapley value, we can think of the profits achieved by all possible coalitions of divisions of the firm including the grand coalition of the firm and considering the formation of each of these coalitions to be equally probable, calculate the incremental profits to each division from having participated in these collaborating groups.

The distribution to the i th Division is calculated from the following formula:

$$P_i \sum_{S \in N} \frac{(s-1)!(n-s)!}{n!} \cdot [ACP(S) - ACP(S - i \text{th firm})]$$

where n is the total number of players (divisions), s is the number of players (divisions) in coalition S , $ACP(S)$ is the payoff (or Adjusted Coalition Profit) of coalition S when i is included in that coalition and $ACP(S - i)$ is that coalition's profit without the i th's divisions participation. The term

$$\frac{(s-1)!(n-s)!}{n!}$$

is the probability that the $[ACP(S) - ACP(S - i \text{th})]$ payoff (profit) differential will occur if all possible coalitions are considered to be equally likely. This last assumption corresponds to a Shapley axiom that allocation is independent of the labelling or ordering of game players and can be interpreted in this situation to mean that position in the vertical chain of the firm is not relevant to determining the amount of profit attributed to a division. Assuming that ACP is best rendered along the dotted line in Graph 2, the ACP of coalitions is taken to be the product of a coalition's contribution margin and its MF Factor Apportionment Ratio (Col 3 \times Col 4). The calculation of ACP 's is given in Col. 5 of Table 4, the first 3 lines of which include part of Table 3 (i.e., when individual divisions act as coalitions of 1).¹²

Step 4: Calculation of Transfer Prices

The last step, whether the firm has opted for an unadjusted Massachusetts formula allocation or for a Shapley value MF allocation, is the mechanical one of calculating those prices which will result in the predetermined divisional profits.

¹⁰F. H. Knight, *Risk, Uncertainty and Profit*, 1921; R. Coase, 'The Nature of the Firm', *Economica*, 1937, pp. 386-405; M. Silver and R. Auster, 'Entrepreneurship, Profit and Plant Size', *Journal of Business*, April 1969 and A. A. Alchian and H. Demsetz, 'Production, Information Costs and Economic Organization', *American Economic Review*, 1972, pp. 777-795.

¹¹The sequences in which different divisions can join together in achieving the total integration represented by the dotted line have been described as expansion paths by A. Thomas, *The Allocation Problem: Part Two*, AAA, 1974. Adjusted coalition profit which is increasingly profitable to scale or degree of integration is technically described as super-additive.

¹²For a fuller discussion of calculation procedures, refer to D. Jensen, *ibid.*, p. 847 or E. Loehman and A. Whinston, *ibid.*, p. 613.

Table 4
Coalitions, Apportionment Ratios and ACPs

Col 1 Coalition of Divisions	Col 2 Coalition Variable Costs	Col 3 Contribution Margin Col 2 \times 38%	Col 5 Profit Factor Apportionment Ratio	Col 5 Adjusted Coalition Profit (ACP) Col 3 \times Col 4
1	\$466.66	177.00	$\frac{1}{3} \left\{ \frac{1000}{4200} + \frac{200}{1000} + \frac{0}{2667} \right\} = 0.146$	\$26
2	933.33	354.00	$\frac{1}{3} \left\{ \frac{2000}{4200} + \frac{500}{1000} + \frac{0}{2667} \right\} = 0.325$	115
3	533.33	202.00	$\frac{1}{3} \left\{ \frac{1200}{4200} + \frac{300}{1000} + \frac{2667}{2667} \right\} = 0.529$	107
1 + 2	1400.00	531.00	$\frac{1}{3} \left\{ \frac{3000}{4200} + \frac{700}{1000} + \frac{0}{2667} \right\} = 0.471$	250
1 + 3	1000.00	379.00	$\frac{1}{3} \left\{ \frac{2200}{4200} + \frac{500}{1000} + \frac{0}{2667} \right\} = 0.675$	256
2 + 3	1466.67	556.00	$\frac{1}{3} \left\{ \frac{3200}{4200} + \frac{800}{1000} + \frac{2667}{2667} \right\} = 0.854$	474
1 + 2 + 3	1933.33	733.00	$\frac{1}{3} \left\{ \frac{4200}{4200} + \frac{1000}{1000} + \frac{2667}{2667} \right\} = 1.000$	733

Using column 5 the Shapley function allocation is demonstrated for Division #1:

$$\begin{aligned}
 \text{Total Profit} \\
 \text{Allocation to Div. \#1} &= \sum \frac{(1-1)!(3-1)!}{3!} [\$26 - 0] + \frac{(2-1)!(3-2)!}{3!} [\$250 - \$115] + \frac{(2-1)!(3-2)!}{3!} \\
 &\quad \times [\$256 - \$107] + \frac{(3-1)!(3-3)!}{3!} [\$733 - \$474] \\
 &= [8 \frac{2}{3} + 22 \frac{1}{2} + 24 \frac{5}{6} + 86 \frac{1}{3}] \\
 &= \$142 \frac{1}{3}.
 \end{aligned}$$

Applying the same formula, profit distribution to Division #2 is \$295.83 and to Division #3 is \$294.83, and the total distribution is \$733.

These prices are provided in Table 5 first for a Massachusetts formula allocation and then for a Shapley value MF distribution.

Concluding comments

These methods of setting transfer prices have been offered and explained in the framework of a mathematically programmed solution. However, it should be clear that a mathematically programmed budget is not at all necessary since the same calculations could have been made for a production schedule generated by clever intuition or by gross incompetence (albeit, for a more or less diminished profit). Putting the calculations in the framework of an l.p. model illustrates, it is hoped, that these approaches to transfer prices provide a way of distributing profit which in no

way interferes with decision making and the process of optimising that profit.

Both the MF and the Shapley value MF approaches are based on a causality rationale and on an effort to spell out those functions and factor inputs which contribute to profit. They diverge only in the assumption of how these factors contribute to shape profit, a question that may well be an empirical one and quite specific to individual firms. Behaviourally, neither the MF nor the Shapley MF approach appears to suffer from the many complaints levied at other transfer pricing procedures. Unlike an opportunity cost or shadow price approach, bottlenecks are not rewarded nor are long-range provisions of capacity penalised to the advantage of short-run maximisation. On the other hand, since profit allocation is partially based on the supervision of capital assets,

Table 5
Calculation of Transfer Prices

	<i>Col 1 Massachusetts Formula Profit Allocation</i>	<i>Col 2 Per Unit Divisional Profit Col 1 133 1/3 Units</i>	<i>Col 3 Variable Cost per Unit</i>	<i>Col 4 Carried Forward Cost (Col 5) of Prev. Division</i>	<i>Col 5 Transfer Price</i>
Division 1	107	0.8025	3.50	0	\$4.3025
Division 2	238	1.7850	7.00	4.3025	13.0875
Division 3	388	2.910	4.00	13.0875	20.0000
Total	733				per Table 1
<i>Shapley Value MF Allocation</i>					
Division 1	142.33	1.0675	3.50	0	\$4.5675
Division 2	295.83	2.2221	7.00	4.5675	13.7896
Division 3	294.83	2.2112	4.00	13.7896	20.00

central management would have to guard against the over-accumulation of fixed assets by using strict capital budgeting procedures. As Roth and Verrecchia have pointed out (and assuming that agreement can be arrived at regarding factors contributing to profit) the Shapley value provides a one-time negotiated agreement for distributing the gains of collaboration that is equitable.¹³ Although a division manager might be induced to overstate the portion of his division's assets and payroll to be devoted to the production of transferred products (i.e., to x_3 in lieu of x_1), there is every reason, in fact, for him to use labour and capital as efficiently as possible, since profit can only be shared in if each manager helps to create it. This last point does underscore the fact that the MF and Shapley methods set prices on the basis of an ex ante plan, which may or may not be realised exactly. If the factors contributing to profit are well defined, the resulting transfer prices do not appear to be sensitive to minor variances between budgeted and actual activities of the firm, but that is a result which might vary in individual situations. For major changes in plan, new calculations would have to be made to find out whether new transfer prices would be justified.

¹³A. E. Roth and R. E. Verrecchia, 'The Shapley Value as Applied to Cost Allocation: A Reinterpretation,' forthcoming in *Journal of Accounting Research*, and R. E. Verrecchia, 'A Question of Equity: Use of the Shapley Value to Allocate State and Local Income and Franchise Taxes', University of Illinois College of Commerce and Business Administration Working Paper 569.

Some may argue that too heavy a weighting is being accorded to the sales function. That may well be, and one perhaps not undesirable outcome of both an MF or Shapley approach might be to encourage divisions at the front end of vertical corporate chains to change the nature of their activities and to engage in more marketing efforts on their own behalf (in contrast to leaving sales to the last division in the chain or to a centralised marketing division). If, in any case, this criticism proves to be valid, top management must then decide (and hopefully gain agreement) on an 'a priori' negotiated basis how best to weight selling effort, or personnel management, or the operation and maintenance of plant and facilities. Finally, for firms that wish to use an ROI measure of the management of profit centres, both the MF and Shapley value allocations make a specific profit attribution so that an ROI ratio can readily be developed.

Thus if top management is willing to assume the admittedly difficult task of specifying those responsibilities of divisional managers that cause profit, i.e. the factors of profitability, it has available to it techniques that supplement decision making without interfering with it. Moreover, these techniques recognise the need for measuring relevant variable costs but attribute profit to centres in a manner compatible with top management's desire to measure performance on the basis of multiple factors such as return on investment, personnel management and market results.

Aspects of Accounting and Internal Control—India 4th Century BC

N. Choudhury

Ancient Sanskrit works which have received popular exposure appear to be mainly of a philosophical or literary nature. However, an early treatise on practical economics and public finance is to be found in the *Arthaśāstra*.¹ The authorship is attributed to Kauṭilya who, towards the end of 4th century BC,² was minister to Chandragupta, the founder of the vast Mauryan empire in Northern India. The *Arthaśāstra* was intended to provide a comprehensive manual on statecraft for the king and although scholars are not specific as to the precise impact of Kauṭilya's ideas they seem to share Spengler's view [9, p. 225] that the *Arthaśāstra*... 'apparently continued to serve as a guide to both rulers and later writers, much of its content still being reflected as many as fifteen centuries later...' As part of the proposed system of financial administration, Kauṭilya referred to accounting concepts and internal control procedures. These references, although contained in four sections out of a total of one hundred and eighty sections of the text, constitute instructions which enter into a fair amount of detail. Owing to the scarcity of supplementary evidence on the period, however, it is impossible to decide to what extent the suggested procedures were incorporated into practice either during or after Kauṭilya's time. This paper is, therefore limited in scope inasmuch as it deals with ideas and not necessarily with practice.

Major translations of the *Arthaśāstra* into English include that of R. Shamasastri [8], who was responsible for publishing the first Sanskrit version in 1909, and a more recent work by R. P. Kangle [5] which has as its companion volumes a

Sanskrit text [4] and a Study [6].³ It is mainly from Kangle that the translated terms and the excerpts which follow have been drawn (the references being annotated in the sequence: book, section, paragraph). In the case of excerpts it is worth noting that the sections in parentheses are Kangle's own interpretive insertions which do not appear in the Sanskrit text.

Definitions of revenue and expenditure

Kauṭilya prescribed that the responsibility for deciding on the level of revenue required and its method of collection should be given to the Collector General (*samāhartr*) who was also to prepare the annual budget (*karaṇīya*, literally 'that which is required to be done') which consists of what Kangle calls 'items in accounting': an estimate of work completed pending delivery into the treasury (*siddha*) and work-in-progress (*śesa*), and an estimate of revenue, expenditure and balance [5, 2.6.13]. The revenue was to be received into the treasury and stores⁴ by the Receiver General (*samnidhātr*), an official of similar status, whose functions included the construction and supervision of the treasury stores and armoury and the keeping of records such that '(H)e should be conversant with receipts from inside and outside even after a hundred years, so that when asked he would not falter in respect of expenditure, balance and collections' [5, 2.5.22].

³Kangle's source material as noted in [4] included the following:

(i) fragment of a palm-leaf manuscript in Devanagari characters purported to have been written in the 12th century AD;

(ii) a palm-leaf manuscript in Grantha characters claimed to have been of about a hundred years ago;

(iii) a palm-leaf manuscript in Malayalam characters which Kangle assesses to be about three hundred years old;

(iv) three transcripts, the source manuscripts of which are now untraceable, and several commentaries.

⁴A large proportion of the state's revenue was expected to be received in kind, hence the need for comprehensive storage facilities which are described in some detail [5, 2.5.1-7].

¹The usual translation of the Sanskrit word *artha* is wealth and *śāstra* is science. The term *artha*, however, is used here and in other early Sanskrit writings in the wider sense of 'the earth inhabited by men'.

²Although this is the traditional view, both the authorship and date of origin and indeed the very existence of Kauṭilya are disputed by several scholars. See Kangle [6, 0.59 *et seq*] and Dikshitar [2, p. 302 *et seq*] for a discussion of contrary views.

The state's aggregate revenue was classified by Kauṭilya in three different ways. First he had the 'body'⁵ or 'corpus' of income,⁶ *āyaśarīram*, which identified the revenue with its seven sources—city, country, mines, irrigation works, forests, cattle, and trade routes [5, 2.6.1–9]. Secondly, the total revenue was re-classified into seven 'mouths' or 'heads' of income, *āyamukham*, indicating the manner in which the revenue arose, viz. revenue from the sale of the state's goods, the state's share of goods produced by subjects and various taxes and charges [5, 2.6.10].⁷

The third classification consisted of 'current income' (*vartamana*), 'outstanding income' (*paryushita*) and 'income derived from other sources' (*anyajata*).⁸ *Vartamana* was defined by Kauṭilya as that arising from day to day and was probably intended to include income which arose on a regular basis from normal course of operations. Kangle and other commentators are undecided as to the composition of *paryushita* which Kauṭilya explains as '(W)hat belongs to the preceding year or what is transferred from another sphere of activity...' [5, 2.6.19]. Thus it appears to cover the balance brought forward from the previous year (presumably not yet deposited into the treasury and stores until the current year and hence not included in the previous year's *vartamana*) and what was transferred from one departmental superintendent (*adhyakṣa*) to another, possibly between different activities during the current year. *Anyajata* comprised items which nowadays might be referred to as extraordinary income (probably too unpredictable for inclusion in the Collector General's annual budget): unclaimed deposits (possibly relating to goods or monies handed over to the state for safe-keeping or as security), fines levied on errant government servants, property confiscated from rioters and persons dying without issue, gifts to the king and treasure trove.

It is conceivable that Kauṭilya intended to make this income classification exhaustive by including a label for mainstream income which

arose periodically but was distracted by his concern for indicating the administrative possibility of inter-temporal and inter-personal transfers of revenue which he categorised as *paryushita*.

Having described three alternative ways of classifying the state's revenue, Kauṭilya went on to mention, almost as an afterthought, certain events which would have the effect of augmenting the state's revenue [5, 2.6.22]:

Accretion, viz., increases in the price of commodities at the time of sale, excess in weights and measures called surcharge or the increase in price because of competition for purchase—this is (also) income.

There appear to be three separate sources referred to here:

(a) income from increase in the price of commodities at the time of sale⁹; the meaning of this is not clear although one may conjecture that Kauṭilya was referring to realised holding gains, in excess of expected selling prices, on the sale of state goods.

(b) income from differences between royal and market weights and measures; this would have been caused by the practice of allowing the state a handling charge by having the standards for receipts of goods into (payments of goods out of) the treasury higher (lower) than the standards used in the market [5, 2.19.21–23, 29 and 6, p. 180].

(c) income from price increases caused by competition for purchase; this would have resulted from Kauṭilya's policy that any excess in selling prices realised by traders over their declared prices should accrue to the state [5, 2.21.9].¹⁰

As no further reference is made to the above, it seems unlikely that Kauṭilya envisaged that his proposed accounting system would isolate and quantify these effects.

Kauṭilya's 'body' of expenditure, *vyayasarira*, consisted of fifteen types including ceremonial and charitable expenditure, expenses of the palace, factories and warehouses, defence and

⁵Sen [7, p. 4] suggests that the attribution of corporal metaphors to revenue and expenditure classifications may have been part of Kauṭilya's overall concern for maintaining a balance between these so as not to feed one at the expense of starving the other.

⁶Kangle uses the terms 'revenue' and 'income' interchangeably when translating from the Sanskrit word *āya*.

⁷Specifically, there was a fixed tax on villages, a charge for coins manufactured, a charge for testing coins, a charge on goods received into the treasury and fines for violation of state regulations.

⁸Shamasastri [8, p. 60] translates *paryushita* as 'last balance' and *anyajata* as 'accidental income'.

⁹Kangle explains this as a 'natural increase in price' on which he does not elaborate, although he indicates that there is some confusion in the interpretation. Shamasastri [8, p. 60] makes no mention of source (a) in his translation.

¹⁰Kauṭilya also proposed a system of profit-margin control whereby traders were permitted to earn up to five per cent profit on indigenous goods and ten per cent on goods imported from outside the kingdom. There were severe fines for profiteering [5, 4.2.28–30].

intelligence service and costs of animal husbandry [5, 2.6.11].

Subsequently he re-classified these expenditures in the following manner [5, 2.6.23–26]:

- 23 Current [*nitya*] (expenditure), that arising out of current gain [*lābha*] (and) that arising out of gain,—this is (four-fold) expenditure.
 24 What is spent from day to day is current (expenditure).
 25 Receipts (by officers, servants, etc.) after a fortnight, a month or a year is gain.
 26 That arising out of these two is (expenditure) arising out of current (expenditure) and out of gain respectively. This is expenditure.

The interpretation of this excerpt raises some questions:

- (a) are there four types ('four-fold') or only two types of expenditure mentioned?
- (b) do Kangle's insertions in the text (in parentheses) correctly reflect Kauṭilya's thoughts?
- (c) given that 'arising out of' may be understood to mean 'incurred on', what does 'arising out of current (expenditure)' signify?

A certain amount of clarification is achieved by interpreting 'current' (*nitya*) as current activity and 'gain' (*lābha*) as gainful or profit-yielding activity—these giving rise to current expenditure and gainful expenditure. However, the two types of expenditure, as defined, are not mutually exclusive, as gainful expenditure is defined not in terms of its own periodicity but that of the revenue earned by its incurrence. The confusion on this matter appears to be shared, albeit unwittingly, by others. In his commentary, Kangle explains *lābha*, quite differently from his translation above, as expenditure incurred 'at fixed intervals of time, a fortnight, a month, a year etc.'

Shamasastri interprets *lābha* as what is spent on earning 'profit', which is defined rather curiously as '(W)hatever is earned once in a paksha, a month, or a year is termed profit'. Gopal [3, p. 16] avoids any inherent ambiguities and takes *lābha* to mean 'expenditure on investments yielding profit'.¹¹ If this was the meaning intended by Kauṭilya, then *nitya* and *lābha* may be paralleled with revenue and capital expenditure (the references to periodicity being considered irrelevant).

¹¹Gopal also briefly compares Kauṭilya's current gainful expenditure dichotomy with that proposed in a work of a much later period, the *Sukranitisara*: '(E)xpenditure falls under two heads—that which will come back and that which destroys the right forever'.

On the other hand, if Kangle's translation accurately reflects Kauṭilya's thoughts, then it is possible that the classification was intended to distinguish between expenditure which could, if necessary, be curtailed (as in times of famine or war) without any (immediate) adverse effects on the state's revenue and that which could not be so reduced.

The balance (*nivi*) remaining after deducting total expenditure from total revenue (*samjātād āyavyayaviśuddhā*) was to be aggregated with the balance of the previous period and carried forward [5, 2.6.27]. Thus it appears, from this and other definitions, that revenue and expenditure were to be accounted for on a receipts and payments basis (either in cash or in kind) without regard to accruals. Kauṭilya suggested that the Collector General should try to increase the size of this surplus and reduce any deficit.

Recording and auditing

Kauṭilya specified an elaborate administrative structure consisting of separate departments each concerned with particular functions (including one for each item comprising the 'body' of income as defined above). Each department would have its own works officers (*kārmikas*), who would be responsible for carrying out projects (collection of forest produce, extraction of minerals and the like) assigned to them, and accounts officers (*kāraṇikas*) whose duty would be to maintain the day to day accounts and other records relating to these projects. There would also be a central records-cum-audit department (*akṣapaṭāla*) under a superintendent (an *adhyakṣa*) of accounts and audit. The information contained in this department was to be fairly comprehensive [5, 2.7.2]:

... the extent of the number, activity and total (income) of the departments; the amount of increase or decrease in the use of the (various) materials, expenses... wages and labourers in connection with factories; the price, the quality, the weight, the measure... in connection with jewels, articles of high value, of low value and forest produce... and payments and receipts in connection with peace and war with allies and enemies.

Although it is not stated, most of this information would have required to have been furnished by the operating departments themselves—the *akṣapaṭāla* acting as a costing department in collating, analysing and summarising cost,

revenue and progress information relating to projects. From these records the superintendent would prepare and hand over to each department a report of [5, 2.7.3]:

... the (revenue) estimate, accrued revenue, outstanding revenue,¹² income and expenditure, balance (the time for) attendance (for audit), (sphere) of activity, customs and fixed rules...

It would appear from the above that the responsibility of the superintendent extended beyond the maintenance of historical records to the preparation of the coming year's revenue forecast (and, perhaps, expense budget) for each department. It is unlikely, however, that he was also required actually to *assign* specific undertakings to the works officers of departments as Kangle suggests [6, p. 201]. This function one would expect to be discharged by the individual department heads possessing the necessary specialist knowledge.¹³

Annually, on the full moon day in the month of *Asādhā* (around mid-July) the works officers and the accounts officers were to present themselves for audit at the *akṣapaṭāla* with sealed containers (of money and goods) and sealed books of accounts. To prevent any form of collusion these two types of officers would not be permitted to communicate with one another. Kauṭilya appreciated the importance of a prompt audit to enable discovery of irregularities and accordingly specified severe penalties for dilatory officers. Works officers arriving without proceeds from undertakings were to be fined one-tenth of the amount due from them; whereas an accounts officer whose books were not ready for auditing would be fined an amount which was equivalent to between ten and twenty per cent of his annual salary.

¹² There is no indication of a link between these departmental estimates or budgets and the total budget of the Collector General (see above) although it is possible that the *akṣapaṭāla* would have served as an information intermediary for this purpose. 'Accrued revenue' and 'outstanding revenue' are Kangle's translations of *siddhā* and *sēsa* which appear to refer to 'work completed' and 'work-in-progress' as in the state budget.

¹³ Kangle's impression is consistent with his translation [5, 2.7.4] which states that the superintendent of accounts should appoint project superintendents whereas Shamastra [8, p. 62] understands that a project superintendent 'shall be appointed' but does not state by whom. A more plausible appointor would have been the Collector General. Further as Kangle does not believe that the status of the superintendent was very high as he was 'only an *adhyakṣa*' without any special designation [6, p. 201] it is difficult to reconcile this status with the very important task of project allocation. Incidentally, Choudhuri [1, p. 114] gives this and other departmental superintendents a status equivalent to that of the Collector and Receiver Generals—again, this perhaps overstates the importance of the function.

The audit procedure prescribed is indicative of Kauṭilya's clarity of thought and depth of understanding on matters of internal control and accounting process [5, 2.7.30–33]:

30 And he should check (the accounts) for each day, group of five days, fortnight, month, four months and year. 31 He should check the income with reference to the period, place, time, head of income, source, bringing forward, quantity, the payer, the person causing payment to be made, the recorder and the receiver. 32 He should check the expenditure with reference to the period, place, time, head (of expenditure), gain, occasion, the thing given, its use and amount, the person who orders, the person who takes out, the person who delivers and the receiver. 33 He should check the balance with reference to the period, place, time, head, bringing forward, the article, its characteristics, amount, the vessel in which it is deposited and the person guarding it.

The documents involved in these verification procedures are not specified—Kauṭilya may have wished to allow the superintendent to decide what would constitute appropriate evidence of particular transactions.

The accounts officer was encouraged, with the threat of high penalties, to maintain his records in impeccable form [5, 2.7.35–40]:

85 For the writing down an item (in the accounts) without any order or in a wrong order or in an illegible manner, or twice over, the fine is twelve *paṇas*. 36 For one writing down the balance (in any of these ways) the fine is double (that). 37 For one who swallows it, the fine is eight-fold. 38 For one who destroys it, the fine is one-fifth of the amount and restitution (of what is lost). 39 In case of a false statement, the punishment is that for theft. 40 If admitted afterwards, (the fine is) double, so also if an item is forgotten and then brought in.¹⁴

Detection of irregularities

In addition to the audit rules the *Arthaśāstra* cites at length the ways in which irregularities may take place so that these may be detected and prevented. The king was advised to exercise close control over the treasury 'as all undertakings are

¹⁴ Twelve *paṇas* was equivalent to about two and a half per cent of his annual salary; the amount of the fine for false statement cannot be determined as there were numerous types of thefts each with its level of fine.

dependent first on the Treasury' [5, 2.8.1]. Particular attention was directed to ways in which depletion of the treasury could be affected by dishonest subordinates [5, 2.8.4–18]:

'Hindrance', i.e. failure to carry out a job or to realise or deliver its benefits.

'Lending' of treasury goods without authorisation.

'Trading' in the state's commodities.

'Concealment' by altering the date due for debts.

'Causing loss' by exceeding budgeted expenditure or failing to earn the budgeted revenue.

'Use' of treasury articles for private benefit, particularly jewels and valuables.

'Interchange', i.e. swapping of treasury goods for inferior personal goods.

'Misappropriation' by understating revenue or overstating expenditure.

Kauṭilya then went on to detail forty ways in which embezzlement may have been carried out [5, 2.8.20]:

20 Of those (officers) the ways of embezzlement are forty. 21 What has accrued first is realised afterwards, what is to accrue later is realised first, what is to be carried out is not carried out, what is not to be carried out is carried out, what is carried out is made out as not carried out, what is not carried out is made out as carried out, what is carried out a little is made out as much, what is carried out much is made out as little, one thing is carried out while another is made out (as carried out), what is carried out from one source is made out as from another, what is to be paid is not paid, what is not to be paid is paid, payment is not made in time, payment is made untimely, a little paid is made out as much, what is overpaid is made out as little, one thing is given while another is made out as given, what is paid to one is made out as paid to another, what is delivered (into the treasury) is made out as not delivered, what is not delivered is made out as delivered, forest produce for which the price has not been paid is delivered, that for which the price has been paid is not delivered, concentration (of goods) is made out as dispersal, or dispersal made out as concentration, an object of high value is changed for one of low value, or one of low value for one of high value, the price is raised, or (the price is) reduced, the year is made discrepant as to months, or the month discrepant as to days,

discrepancy as to source, discrepancy as to head (of income etc.), discrepancy as to workmen, discrepancy in performance, discrepancy in the sum-total, discrepancy in quality, discrepancy in price, discrepancy in weighing, discrepancy in measuring, (and) discrepancy as to (container) vessels—these are the (forty) ways of embezzlement.

In providing what is probably a fairly exhaustive list of possible manipulation Kauṭilya may have hoped that officials would be able to recognise embezzlements and set up preventive controls. Kauṭilya also specified the interrogation procedures which should follow the detection of embezzlements.

In Kauṭilya's view, however, effective control could only be achieved by the use of spies¹⁵ and he urged the superintendent of accounts to use them as a matter of routine to watch over the departments. In a later section the impossibility of detecting all fraud is acknowledged [5, 2.9.32–34]:

32 Just as it is not possible not to taste honey or poison placed on the surface of the tongue, even so it is not for one dealing with the money of the king not to taste the money in however small a quantity.

33 Just as fish moving inside water cannot be known when drinking water, even so officers appointed for carrying out works cannot be known when appropriating money.

34 It is possible to know even the path of birds flying in the sky, but not the ways of officers moving with their intentions concealed.

Summary

The *Arthasāstra* is a comprehensive text covering information on the whole spectrum of matters that should concern a king. It has been criticised for the lack of an 'analytical' orientation [9, p. 228]. However, since the purpose of the text was to provide a definitive instruction manual for the king, a more theoretical and erudite treatise might have been less satisfactory.

One is naturally drawn, in a study of Ancient India, to look for the impact of any Greek influence. The earliest Greek envoy to India appears to have been Megasthenes who visited the court of Chandragupta sometime between 302

¹⁵Kauṭilya considered espionage (in this and other areas) as an integral and essential part of the administrative machinery. Spies were paid a salary like other officials, but as their activities were covert any analogy with present day internal auditors must remain incomplete.

and 288 BC. Extant fragments of his *Indika*, considered by many to be an authoritative description of the Kingdom and society of the period, do not mention Kauṭilya and, in parts, conflict with the *Arthaśāstra*.¹⁶ In view of this it appears that while Kauṭilya drew heavily on earlier indigenous writings and schools of thought (which he acknowledges on several occasions) there does not seem to be any evidence that the *Arthaśāstra* was influenced by Greek thinking of the period.¹⁷

In the *Arthaśāstra*, which is considered by many scholars to be a remarkably sophisticated work on polity, Kauṭilya displayed a clear understanding of the prerequisites of an effective financial administration machinery for the state. He identified the sources of revenue and the types of expenditure and specified an internal control system aimed at detecting and preventing fraud. Although this concern with financial control

matters was peripheral to his ambitious overall objective, Kauṭilya can be seen (notwithstanding any problems in translation and interpretation) to have set out the procedures in sufficient clarity and detail for the *Arthaśāstra* to constitute a pioneering work on accounting and internal control.

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¹⁶This has partly contributed to the controversy referred to in note 2 of this paper. Kangle [6, p. 67] explains away the mutual inconsistencies of the works by stating that while the *Indika* was a description of Megasthenes' actual observations the *Arthaśāstra* was a work of normative and ideological nature which may have been followed only in part. However, this issue is not the concern of this paper.

¹⁷A comparative study of Kauṭilya's financial administration system with that of ancient Greek states does, of course, provide a subject for further research.

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Two Seventeenth Century Accounting Statements

B. S. Yamey

Between 1660 and 1715 various members of the Foley family were engaged in the making of iron, and as a group were probably the largest producers of iron in England. The family fortunes were founded by Richard Foley in the 1630s on the basis of works established in and around the Stour Valley. Richard was effectively succeeded by Thomas, who, in turn, in the latter half of the 1660s began to distribute his productive assets among his three sons. The youngest, Philip (1653–1716), kept detailed records and accounts of his activities. Some of this material has recently been published with an editorial introduction.¹

Among the records now published there are two sets of annual 'accounts', one for 1668 and the other for 1669, which cover the twelve months ended 27 March 1669 and 26 March 1670, respectively. This paper discusses these two sets of accounts from the technical accounting point of view. Each set is in fact a short ledger which contains various accounts, incorporates an end-of-year closing procedure, and is organised on a strict double-entry basis. It is evident that each set of accounts summarises the myriad of detailed entries in other basic accounting and statistical records, and probably served as a convenient condensed statement of their contents. The two documents are therefore themselves of interest as examples of summary accounting statements prepared by and for the owner of a number of inter-related works, each in the care of an employee (to be referred to here for convenience as 'manager'). It is not known whether the preparation of statements in this form was common among iron makers or other entrepreneurs.

The main accounts and their interrelatedness

The 1668 accounts begin with a net credit balance on Philip's capital account of £4,702. (All figures quoted are rounded to the nearest £). The opening assets are the debts due from the various managers and 'last yeares accompt for stock remayning' (£7,506), the latter being the total value placed on the unsold products and equipment at each of the works and at the warehouse. The major debt is due to Philip's father. The year ends with a capital balance of £6,881, the increase being the profit for the year of £2,179. The profit is not in fact transferred to the capital account. It appears, as will be shown below, that Philip was not sure how to close off the year's accounts. The next year's accounts, however, are closed off properly: he must have obtained advice or worked the matter out for himself.

The 1669 accounts begin with a credit balance on capital account of £8,830. At the end of the previous accounting year Thomas transferred more assets and some liabilities to his son, Philip, at a price which must have been lower than the book value of the net assets transferred. Hence there was an increase in Philip's opening net assets as compared with the immediately preceding closing net assets.

Among the other documents published in the recent volume is a statement headed 'Stock and Debts belonging to Mr. Philip Foley 27th March 1669'. This includes the book debts, unsold iron and equipment (including, for example, shovels, barrows, hammers, saws, ladles, measures, bellows, carts, hammer beams, riddles and baskets) at the various works and locations in his ownership at the beginning of the new accounting year.

It includes the assets under his control during the preceding year as well as those subsequently transferred to him by his father. The total is £68,830, 'soe' all the stock and debts att all the workes amount unto'.

¹R. G. Schafer (editor), *A Selection from the Records of Philip Foley's Stour Valley Iron Works 1668-74*, Part 1, Worcestershire Historical Society, New Series, vol. 9, 1978. The Editor's useful introduction to the reprinted material is not altogether reliable on the two accounting 'statements' considered here.

This latter total includes £26,900 of stock (the rest being debts due to Philip, suitably reduced by the occasional debts owing to others), which figure is entered as a credit on the capital account 'for stocke remayning at the workes att my entering throughout as appeares.' The remainder of the opening credit entries in the capital account are debts owing by the various managers and the cashier ('my uncle Mr. Henry Glovers accompt of cuntry cash') and on the debit side are to be found the £60,000 owing to his father ('to my father Thomas Foley esq. his accompt which I am to pay him for all his stocke and debts att or belong[ing] to any of his ironworks in Worcester-shire, Staffordshire and Shropshire') and other debts totalling £3,478. The net opening balancing is £72,309 less £63,478, i.e., £8,830 to the nearest £. And this figure in turn is equal to the total of 'stocke and debts belonging . . .', £68,830 (referred to in the preceding paragraph) less the £60,000 owed by Philip to his father.

At this point there is an oddity. On the debit side of the capital account ('Philip Foley his accompt'), after the initial debits have been totalled, the following statement appears, indented:

there is due to mee that I have in stocke and debts	
(vizt) bad and indifferent	£3808
good and sufficient	5022
	<hr/>
	£8830

This sub-total is not added in with the other debits in the account.

It is not obvious how Philip could identify the particular debts or items of stock or equipment which constituted his surplus. The roundness of the sum (£60,000) due to be paid to his father in three instalments seems to preclude the possibility that at the transfer father and son segregated those assets to be paid for from those other assets which were to be treated as a gift.

The accounts of the various ironworks managers are of interest. Each of these accounts is a personal account. The debits are for amounts accountable by the manager to Philip, for example sales to third parties and moneys received from Philip or his agents. The credits are for moneys spent by the manager on Philip's behalf, e.g., works expenses, purchases from third parties and moneys paid to Philip or his agents. The closing balance, invariably a debit balance, is the amount owing by the manager to Philip. A list of debts due to the manager from customers

and others is frequently appended to account for the balance.

But the typical manager's account is more than merely a personal account. It also contains a quantitative accounting of production, shown as an indented statement on the debit side of the account. The following is an extract taken from 'John Wheeler of Cradeley forge his accompt.'²

	T. cwt. q. lb.			
merchant iron				
remayning last accompt	28	10	2	27
made this yeare	53	0	0	10
received from Wolverley	39	9	3	27
	<hr/>			
	121	0	3	8
delivered to Hydemill	10	14	1	17
Bustleholme	13	18	2	22
Hales furnace uses		1	1	2
forge uses		6	1	11
sold retayle	72	13	1	7
	<hr/>			
	97	14	0	3
soe left as per inventory	23	6	3	5

There are no money entries for those quantitative entries which refer to transfers of materials to other works within Philip Foley's group; so that money entries are made only in respect of sales to persons outside the group.³ In the extract above, only the entry for 'sold retayle' is extended as a debit to the money column, for £1,289.

Purchases of materials from persons outside the group are shown on the credit side of the manager's account, sometimes, as for 'charcoles', with quantitative entries as well.

The individual manager's account is therefore a mixture of financial and non-financial data, the common feature being the accountability of the manager to the owner. In this respect the manager's account—a summary of a year's transactions and production—is reminiscent of the periodic account rendered by a subordinate

²I have omitted some detail from the original.

³There are a few exceptions where some quantitative entries have corresponding entries in the money column although no external party is involved. For example, in 'Ralph Whytefoot his accompt of Hubballs Mill forge' 2 cwt. of bar iron 'wanting per R.W. to make good' is debited to his account for £2.26. In 'Thomas Lowbridge his accompt of Wildon forge' almost 16 tons of iron 'wasted in cutting' is not debited to the manager's account, while in the 'Hydemill accompt of rod iron' 19 tons of rod iron 'wasted in cutting at 1 cwt. per ton' is debited to the account. The apparent differences in treatment presumably reflect differences in the arrangements made between Foley and his several managers.

official to his superior on a medieval estate, ecclesiastical or baronial. But here the analogy ends, because the individual managers' accounts are embedded in a complete system of double-entry accounts, and are in this way linked to a profit and loss account. Sales by the manager to third parties are debited to his account and credited to the so-called general account which is in fact the profit and loss account. Expenses paid or incurred by the manager and purchases made by him are credited to his account and debited to the general account. Thus while it is not possible to derive the profit or loss on the year's activities of any one manager from his account, the combined outcome of *all* the activities under Philip Foley's control duly emerges in the general account.

The nature of the general account is especially clear from the 1669 set of accounts. The opening debit is for the 'stocke remayning last yeare', and is the counter-entry for the opening item in the capital account. The other debits are for expenditures made by various managers and others on materials, wages and works expenses, interest on half the debt to the father (the other half being an interest-free loan), and a bad debt written off. The credits are almost all for the sales made by the various managers and others, and profits from a few partnerships. These credits are totalled. Then follows an entry: 'soe remains in stock as in particulars by the inventory...appears to ballance this accompt made up the 26th March 1670.' The closing entry on the debit side is: 'more to Philip Foleys accompt for this yeare' (£2,166); and there is a corresponding credit in the capital account. (Interestingly, there is an unexplained piece of arithmetic inserted to the left of the page of the latter account:

$$\begin{array}{r} 2166 \\ 872 \\ \hline 3038 \end{array}$$

What Foley did was to add the amount of the bad debt written off during the year to the recorded profit, presumably to determine a more realistic profit figure, the bad debt having been taken over at the beginning of the year.)⁴

⁴It is not possible for the effective rate of return on capital in Philip Foley's business to be derived with any degree of reliability. This is so for several reasons. Philip did not have to pay interest on half of the loan from his father. Inclusion of an interest charge would reduce the rate on the initial capital from the apparent 34.4% to 14.0%. (Alternatively, the profit plus interest actually charged is 7.0% on Philip's opening capi-

The proof of the accounting

The general account is followed by an account titled 'The prooffe of the whole accompt.' This is a sort of trial balance *cum* balance account, with debits and credits reversed—and thus is in the nature of the opening balance account frequently encountered in the early practice and teaching of double-entry bookkeeping. The debit entries are for 'the severall accompts that follow for moneys due out of the stocke and debts hereunto belonging,' that is for amounts owed by Philip to his father and other creditors as well as the closing balance on his capital account (£11,051). The credit entries are for the 'moneys owing' to Philip (including the balance of bad debts), the closing stock at the works, and entries for the closing stocks of two partnerships. The totals on the two sides of the 'prooffe' balance to the last farthing.

The general account in the 1668 set of accounts is defective in that the closing balance of stock is not introduced into it as a credit. The account has a debit balance of £5,007, which duly appears as an 'asset' in the 'prooffe', here called 'the accomptants accompt.' Philip at this stage seems to have realised his error. A further statement is appended: 'Soe in conclusion the state of this accompt is as followeth.' The closing inventory is added to the total of the debit balances (taken from the 'prooffe' account), yielding a total of £14,387. This total is then reconciled with the total of what is due to his father, to another creditor, to himself (the balance on his capital account) 'and for this yeare'. This latter figure (£2,179) is the difference between the closing inventory (£7,187) and the debit balance on the general account (5,008), that is, it is the profit for the year.

To return to the 1669 set of accounts: it ends with something unexpected. After the final 'prooffe' account, there is an account headed 'An Accompt of tinn plates.' The debit (and only) entry in it is for: 'I am out of purse on this business to the 26 March 1670', £55. This amount appears, with a similar description, among the 'assets' on the credit side of the 'prooffe'. The offsetting credit is to Philip's capital account, where it is the last credit entry. The editor of the printed selection of Foley documents explains helpfully that the matter referred to was an unsuccessful partnership enterprise which engaged in experiments involving the plating of iron sheets with a

tal plus the £60,000 owed to his father.) Further, the accounts include no entries for the land, buildings and any other 'fixed' assets belonging to the Foley works and used in the making and distribution of iron.

layer of tin. In the 1668 set of accounts there is an account of tin plates, with an opening debit balance of £47, to which a further £8 was added during the year in respect of bar iron and osmund iron supplied by Philip's father, and also interest due to the father 'per interest stock ult. yeare.' It appears that the new balance of £55 was not reopened in the new (1669) set of accounts, presumably in error because an entry for 'the accompt of tinn plates' is to be found in the index ('tabula') preceding the various accounts. The omission was realised belatedly, and the debit balance was reinstated. The amount was treated as an addition

to Philip's capital presumably because at the time of the compilation of the 'prooffe' Philip had not yet considered the experiment to have failed. What is 'out of purse' is not necessarily beyond recovery. The 1669 set of accounts reveals Philip as a skilled 'accountant' and one who should have been able to distinguish between a loss and an asset. The treatment of the account of bad debts shows that even admittedly dubious assets could be treated in the accounts as assets at face value—a practice to be found also in extant ledgers from the fifteenth to the eighteenth centuries as well as in treatises.

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The Role of Labour Variances in Harrington Emerson's 'New Gospel of Efficiency' (1908)

Paul Sutcliffe

Introduction

This article demonstrates that there is a significant difference between the current use of variance analysis as a means of developing, communicating and reporting employee performance in a manufacturing enterprise, and the purpose for which it was originally developed. The argument is largely based upon the work of Harrington Emerson, the scientific engineer, who provided perhaps the single most important contribution to the development and formation of standard costing and variance analysis as accountants know them today. An examination of his contribution, and the contributions of some of his 'accountant' predecessors makes it clear that rather than being used to generate information on employee performance throughout the organisation, standard costing and variance from standard was developed to serve the dual purposes of:

- (a) implementing a 'forward looking' accounting system and
- (b) providing the 'proof' of the cost savings that were being achieved by the efficiency engineers.

Variance analysis, as an accounting tool appropriate to the achievement of control, has been criticised on the grounds that it neglects the behavioural assumptions necessary for its successful implementation. This article argues that these criticisms have arisen because the technique is being used in a manner other than that for which it was intended, by a profession with skills other than those for which it was designed.

Variance analysis: useful, but . . . have we missed the problem's source?

It does not appear to be contentious to suggest that standard cost and variance analysis are cen-

tral to the best accounting practice of developing, communicating and reporting employee performance data throughout the organisation. After all, management accounting texts and many accounting journals allocate much space to the topic. In fact, E. H. Caplan, while recognising the debt that accounting owes to the many diverse methodologies and practices conveniently grouped under the banner of scientific management, affirmed that the use of standard costing provides the most suitable accounting technique available to generate such information.¹

Notwithstanding the recognition of variance analysis as the 'best' accounting technique available to develop information on employee performance, the technique has attracted the criticism of 'behaviouralists' for two not unrelated reasons:

- (a) The comparison of standard with actual performance overlooks a number of unpredictable and potentially undiscoverable variables. As such it becomes necessary to evaluate the quantifiable results of variance analysis in the context of the equally important qualitative variables.²
- (b) The implementation dimension and its consequences have been neglected. As a result

¹Edwin H. Caplan, *Management Accounting and Behavioral Science* (Addison-Wesley; Menlo Park, California, 1971), pp. 13-15, 60, 61.

²These criticisms are not peculiar to variance analysis but also encompass the wider 'control' incumbent in the budgetary process. For example see Rensis Likert, 'The Effects of Measurement on Management Practices' in *Management and Motivation* (Penguin, Harmondsworth, Middlesex, 1973) Ed. Victor H. Vroom and Edward L. Deci, pp. 214-217. See also Jacob G. Birnberg and Raghu Nath, 'Implications of Behavioral Science for Managerial Accounting', *Accounting Review*, July 1967, pp. 468-479 and L. S. Rosen and R. E. Schneck, 'Some Behavioral Consequences of Accounting Measurement Systems', *Cost and Management*, October 1967, pp. 6-16 for some overviews of the problem.

there has been an undue, and unhealthy, concentration on the techniques themselves as the end, rather than as a means to achieve an end.

This latter behaviouralist view has been synthesised by E. H. Caplan who developed a series of behavioural assumptions consistent with the traditional management accounting model of the firm and contrasted those assumptions with the behavioural assumptions generated by modern organisational theory.³ The implication is that the behavioural assumptions implicit in the use of standard costing and variance analysis cannot be ignored. The mode of implementation and means of interpretation are crucial to the success of the techniques as a means to achieve objectives of desired performance, and any implementation consistent with traditional behavioural assumptions will not suffice.

While a significant body of literature would support the behaviouralist's assessment of the problems inherent in the successful implementation of standard costing and variance analysis (and certainly it is not the viewpoint of this author that those assertions should be challenged) there is evidence to suggest that the criticisms are misdirected. Instead, criticisms should be levelled at the use of the techniques for purposes for which they were not designed. Variance from standard as determined by accountants was never meant to be a significant element in the communication of employee performance.

Scientific management and the accounting records

It appears to be accepted that scientific management practices and principles were a significant element in the development of standard costing systems. In fact Solomons went so far as to state, 'It is impossible to take any discussion of the origins of standard costing far without acknowledging its close connection with the scientific management movement in America generally, for standard costing means little without standard processes and standard operating times, such as F. W. Taylor and his followers developed'.⁴ However accountants did not play a dominant role in the development of scientific management principles, nor was the accountant or his accounting

system necessary for their successful commercial application.

The initial emphasis of scientific management was on the analysis of the physical tasks themselves as the means to improve the workers' performance.⁵ Wells notes that the 'transition from physical to monetary standards followed, somewhat naturally, when the workers with monetary responsibilities were brought within the scheme'; even then the resultant cost records 'were not necessarily double entry, or connected with the firm's general accounting system' but rather were 'designed and maintained by the engineer'.⁶

F. W. Taylor was the best known and, arguably, the most influential figure in the scientific management movement. He made it clear that the relevant data for the achievement of scientific management objectives of efficiency was based on time and motion studies developed outside the accounting system.⁷ The accountant, however, had an important role to play: to develop the 'exact cost of each article of merchandise finished during the previous period' and to prepare comparative cost statements.⁸ This view is supported by Aitken who noted that the cost accounting reforms that surrounded the application of Taylorism to operating concerns were directed at the accurate and prompt development of information on incurred costs of production. The cost records would then be capable of demonstrating the cost savings achieved by the application of the Taylor system.⁹

⁵Peter F. Drucker, *The Practice of Management*, 2nd ed. (London, Mercury Books, 1962), p. 247: 'Scientific management focuses on the work. Its core is the organized study of work, the analysis of work into its simplest elements and the systematic improvement of the worker's performance of each of these elements'.

⁶M. C. Wells, 'Some Influences on the Development of Cost Accounting', *Accounting Historians Journal*, Fall 1977, pp. 52-54.

⁷F. W. Taylor, *The Principles of Scientific Management* (New York: Harper and Brothers, 1916), pp. 23-27.

⁸See F. W. Taylor, 'Shop Management', pp. 111, 115 in *Scientific Management—comprising Shop Management, the Principles of Scientific Management, Testimony Before the Special House Committee*, with a foreword by Harlow S. Person (New York: Harper Brothers, 1947). Taylor required the accounting records to develop the 'exact cost of each article of merchandise finished during the previous period', and to prepare comparative cost statements.

⁹Hugh G. J. Aitken, *Taylorism at Watertown Arsenal, Scientific Management in Action: 1908-1915* (Massachusetts: Harvard University Press, 1960), pp. 88, 113-119, 121. Aitken made it clear that: (1) The costing reforms that surrounded the application of Taylorism to operating concerns were directed at the allocation of overhead to production in such a way that a more accurate cost figure could be developed. (2) The cost accounting function was exclusively to record incurred costs of production. (3) The prompt development of accurate cost

³Caplan, *op. cit.*, ch. 2 and 3, especially pp. 17, 30, 31.

⁴D. Solomons (ed), 'The Historical Development of Costing' in his *Studies in Cost Analysis*, 2nd ed. (London: Sweet and Maxwell, 1968), p. 37.

Historical precedence: the relationship between standard costs and the accounting records

The use of standard or predetermined costs as part of the formal cost records is not exclusively a 20th century development. F. W. Cronhelm (1818), Emile Garcke and J. M. Fells (1887) and G. P. Norton (1889) all contemplated the use of what was tantamount to standard costs as a useful bookkeeping technique to check the economy of production (or, probably more correctly, the honesty of employees involved in that production). The 'standard costs' mooted by these writers however could not be considered as equivalent to current practice. They were not fully integrated into the accounting records, nor were they developed to generate data on the productivity of employees.¹⁰

It was the scientific management principles of F. W. Taylor and his colleagues which brought 'standards', as a technique appropriate to the achievement of improved productivity, the acceptance they still command today. It was their work on the use of standards that was central in providing the impetus for the development of the standard costing systems and variance analysis that remain an important element of current management accounting. However they did not require, nor did they promote, the development of accounting systems incorporating standard costs as an element in the achievement of the efficiency criteria they established via time and motion study.

At much the same time as the scientific managers were refining their techniques for determining standards with respect to employee performance, articles advocating the development

of accounting records on the basis of other than past incurred costs appeared. Amongst them were Percy Longmuir (1902), H. S. Garry (1903) and John Whitmore (1908).¹¹ These writers considered the inclusion of standard costs, though standards not as rigorously determined as the scientific managers would have them, in the accounting records as a useful adjunct to determining discrepancies between the 'proper' and 'improper' costs of production. Between them they recognised the fundamental elements of variance analysis: price, usage and volume variances. Whitmore has, in fact, been credited with the earliest description of a fairly complete standard costing system.¹² The sophistication of Whitmore's arguments and his technical proficiency in introducing standard costs into formal records were highly developed. However, like the other two writers, the purposes for which those standard costs were developed and included in the accounting framework were not clearly associated with the achievement of increased productivity.¹³

There can be little doubt that Alexander Hamilton Church played a major part in the development of cost accounting.¹⁴ In fact it has been suggested that he 'probably did more than anyone, both directly and indirectly, to promote costing as it is now known chiefly because he promoted thought'.¹⁵ His major contributions, however, were in his discussion of the problems presented by indirect manufacturing costs and 'his emphasis on the need to organize the factory properly, and for the accounts to mirror that organization'.¹⁶ He was not particularly concerned with the role that accounting 'variances', rather than engineering 'variances', had to play in evaluating employee performance. Wells recognised the con-

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statements was 'generated, as a by-product' of the application of Taylorism. (4) Comparative figures on the cost per unit were to be used to demonstrate the cost savings engineered by the Taylor system. (5) There was no 'regular' way of checking estimates against incurred costs. (6) Taylor recognised that records of actual hours worked could be used by both scientific managers and accountants.

¹⁰F. W. Cronhelm, *Double Entry by Single, A New Method of Book-keeping applicable to all kinds of Business* (London: Longman, Hurst, Rees, Ormie and Brown, 1818), p. 45 considered a 'manufactory' account debited with the quantity that ought to be produced. Emile Garcke and J. M. Fells, *Factory Accounts, Their Principles and Practice* (London: Crosby Lockwood and Co., 1887), p. 52 briefly (one paragraph) referred to the use of estimates for labour costs and material usage in production, primarily for purposes of maintaining a check on the quantity of materials drawn from stores. G. P. Norton, *Textile Manufacturers' Bookkeeping*, 1st ed (London: Hamilton and Co., 1889) incorporated a comparison of prices that would have been charged by independent contractors and the internal costs of production.

¹¹Percy Longmuir, 'Recording and Interpreting Foundry Costs', *Engineering Magazine*, September 1902, pp. 887-894; H. S. Garry, 'Factory Costs', *Accountant*, July 25, 1903, pp. 954-961; John Whitmore, 'Shoe Factory Cost Accounts', *Journal of Accountancy*, May 1908, pp. 12-25.

¹²Solomons, *op. cit.*, p. 37.

¹³See Solomons, *op. cit.*, p. 42. Longmuir's primary objective was to improve the basis of estimation of costs and profits but, as Solomons indicates, he noted the potential of 'standards' (or more accurately: long run average costs) as a check on the economy of production. However the role that the accountant was to play in the achievement of control was not made clear.

¹⁴Alexander Hamilton Church, 'The Proper Distribution of Establishment Charges', *Engineering Magazine*, July-September 1901 and October-December 1901; *Production Factors in Cost Accounting and Works Management*, History of Accounting Collection (New York: Arno Press, 1976).

¹⁵Roland Dunkerley, 'a former President of the Institute of Costs and Works Accountants' quoted in Solomons, *op. cit.*, p. 24.

¹⁶M. C. Wells, 'Four Cost Accounting Classics: A Review', *Accounting and Business Research*, Autumn 1977, p. 302.



tribution Church made to modern cost accounting but noted that 'Church and his contemporaries were extremely vague about the purposes to be achieved by their costing system'.¹⁷

The importance of Harrington Emerson

Today standard costing and variance analysis appear to be accepted as important tools of the accountant in achieving desired performance objectives and/or as a useful medium by which information on employee performance can be communicated throughout the organisation. However, it is clear that:

- (a) F. W. Taylor and his colleagues were largely responsible for the development of the techniques, principles and practices on which the use of standard costs as a means to achieve efficiency objectives have been based. However, they were not concerned with the introduction of standard costs into the formal accounting records.
- (b) The early accounting writers, who were largely responsible for the development of the technical constructs necessary for the development of standard cost accounting systems, did not concern themselves with the performance and motivational objectives to which current use of standard costing appears to aspire.

One must look elsewhere for the genesis of standard cost accounting which exhibits both the technical and purpose oriented parameters of current practices. The obvious source appears to be amongst the successors to those early scientific managers of the Taylor era.

In a series of articles in the *Engineering Maga-*

zine of 1908 and 1909,¹⁸ Harrington Emerson advocated the development of an information system specifically directed towards the achievement of efficiency objectives. As part of his explanation Emerson noted the rôle that accounting was to play in this drive for efficiency.

This series of articles was considered sufficiently innovative and convincing for the editors of the *Engineering Magazine* to have had no hesitation in claiming that Emerson was 'preaching... a new gospel of efficiency'.¹⁹ Solomons recognised that after the Emerson articles came a period of elaboration, consolidation and, in some respects, sophistication of standard cost accounting practices.²⁰ Emerson, whether consciously or unconsciously, blended the technical expertise of Whitmore *et al.* with the efficiency objectives and principles of the scientific management movement. He developed a standard costing system concerned not only with the use of standard costs as predictions of the 'proper' costs of production, but also as an adjunct to the achievement of efficient performance by the work force.²¹ Within the framework of Emerson's attempt to develop an integrated information system it is possible to identify the rôle that accounting, and accountants, had to play in the achievement of the efficiency objectives.

Emerson was dissatisfied with the general constructs of the accounting system of his time for

¹⁸Harrington Emerson, 'Efficiency as a Basis for Operations and Wages', *Engineering Magazine*, July 1908 to March 1909: 'I. Typical Inefficiencies and their Significance', July 1908, pp. 529-536; 'II. National Efficiencies; Their Tendencies and Influence', Aug. 1908, pp. 661-672; 'III. The Strengths and Weaknesses of Existing Systems of Organization', Sept. 1908, pp. 909-920; 'IV. Standards: Their Relations to Organization and to Results', Oct. 1908, pp. 33-42; 'V. The Realization of Standards of Practice', November 1908, pp. 170-178; 'VI. The Modern Theory of Cost Accounting', December 1908, pp. 336-346; 'VII. The Location and Elimination of Wastes', January 1909, pp. 676-686; 'VIII. The Efficiency System in Operation', February 1909, pp. 815-824; 'IX. What the Efficiency System may Accomplish', March 1909, pp. 998-1002.

¹⁹Foreword to 'I. Typical Inefficiencies and their Significance', *Engineering Magazine*, July 1908, p. 529.

²⁰Solomons, *ibid.*, p. 48, suggested that the period 1910 to 1950 was primarily a period in the evolution of accounting devoted to the conversion of ideas into practice. Emerson, then, was amongst the last in Solomons' era of 'new ideas'.

²¹Emerson's accounting system did lack certain qualities that are now associated with standard cost accounting systems. For example he advocated that the accounting system exhibit a total variance only. However the accounting record of the variance from standard was, primarily, to demonstrate the total cost savings achieved by the efficiency engineers. A fundamental problem with Emerson's work was that he did not make it clear whether he was using an 'ideal' or a 'practical attainable' standard.

¹⁷M. C. Wells, 'Some Influences on the Development of Cost Accounting', *op. cit.*, p. 54. Wells goes on to point out that the mechanical engineers were primarily interested in the development of product costs for pricing purposes: 'Hence the proposal to allocate *all* costs to production'. With the shift in emphasis to control the purpose of the Church system was expanded specifically to include performance measurement objectives: objectives still claimed by modern cost accounting systems. There was however no fundamental change in the accounting system which was to satisfy these 'new' performance objectives. Given that the allocation of overhead costs distorts any performance measure, Wells argues that the inadequacy of modern cost accounting systems can be traced to the use of those systems for purposes other than those for which they were designed.

two general reasons:²²

- (a) There was an inordinate delay in developing the costs of production.
- (b) The cost figures that were developed did not represent the 'real costs' of production; cost data generated by a system dependent on incurred costs were distorted by the inclusion of the 'hap hazard'.²³

The totality of his vision however embraced much more than an accounting system that would provide more timely and less distorted cost data. Emerson was concerned with the development of an information system relevant to the achievement of efficiency objectives. Accounting was only one element in that system.

From the outset Emerson claimed that the achievement of efficiency objectives was fundamentally an engineering and not an accounting function. He isolated two general causes of inefficiency amongst employees:

- (a) That the employees were working under adverse conditions without appropriate knowledge of the job at hand.²⁴
- (b) There was not the appropriate incentive for employees to increase their efficiency.²⁵

The remedy for this situation was to be achieved by the creation of, or an increase in, the staff of efficiency engineers. Their task was to determine standards, maintain records, direct workmen, determine any deviation from standard and

those responsible for that deviation,²⁶ and to ensure that employees ultimately achieved conformity with the work standard.

While this approach did not, of course, involve the accountant in the efficiency achievement process, he did have a role to play in that process: Emerson advocated the conversion of the scientific engineers' standards into cost equivalents and their inclusion in the formal accounting records as a means of satisfying the timeliness and non-distorted criteria he wished to establish for the accounting system. It was through the accountant's involvement in this conversion process that he was to justify his efficiency achievement usefulness.

To highlight the accountant's role in the achievement of efficiency objectives a number of arguments developed in Emerson's articles will be examined. The procedure by which management was convinced of the need for the commencement and continuation of an efficiency system will be reconstructed. The role of the accountant in the achievement, and ultimately the protection, of efficiency gains can then be examined.

The efficiency engineer—gaining access

The efficiency engineer's tender for the job of improving productivity in the shop was based on a comparison of incurred and standard costs: management would direct the accountant to provide the incurred cost of the previous period's activities to the efficiency engineer. After appropriate surveys the efficiency engineer would recast that incurred cost statement in the form of standard and 'avoidable' costs, highlighting the savings to be made. It was hoped that this recast cost statement would justify the increased administrative costs inherent in the implementation of an efficiency system and therefore overcome any management resistance to the employment of the efficiency engineer, and to the implementation of the efficiency programme. Emerson recognised that achievement of '100 per cent' efficiency was a long term objective—the preliminary cost statement presented to management would indicate short term objectives and costs involved in their non-achievement, as well as the ultimate goal, and the ultimate savings. Once efficiency procedures were begun, further periodic statements would be

²²A view which he suggested was widespread throughout the business community. See 'The Strengths and Weaknesses of Existing Systems of Organization', p. 919: 'It is because at the present time good accounting is unrelated to good practice that extensive accounting is viewed with such extreme disfavour by practical men.'

²³Harrington Emerson, 'The Modern Theory of Cost Accounting', p. 336.

²⁴Harrington Emerson, 'Typical Inefficiencies and their Significance', p. 533: 'It is not because men do not work hard but because they are poorly directed and work under adverse conditions that their efficiency is low'. In 'Standards: Their Relation to Organization and to Results', p. 39, he reaffirmed the importance of favourable conditions in the attainment of '100 per cent' efficiency.

²⁵*Ibid.*, p. 37. He noted that 'the enormous spur of direct and personal increase of reward for increased or more intelligent effort' had proved effective in farming. This approach was to be applied to manufacturing concerns. In 'The Realization of Standards in Practice', p. 178, Emerson stated that increased efficiency of labour was to be achieved by 'an increased wage rate set by himself', once the reward-for-performance principle was established, and in 'What the Efficiency System may Accomplish', he reaffirmed that the application of this pecuniary reward, along with the appropriate 'task' instruction, were the means by which 'all the wastes due to ignorance' and 'all the wastes due to laziness and misdirected efforts' were to be reduced, if not eliminated.

²⁶Harrington Emerson, 'The Strengths and Weaknesses of Existing Systems of Organization', pp. 909–920, especially p. 920. See also 'What the Efficiency System may Accomplish', p. 999. Efficiency was attained by 'staff-knowledge-standards'.

presented to management indicating the efficiency engineer's progress, in terms of costs savings, as the 'avoidable waste' was progressively reduced and incurred costs moved towards standard.²⁷

Emerson made it clear that since management was reluctant to incur the increased staff costs essential to the achievement of efficiency, the conversion of the efficiency engineer's physical measures of standard into cost equivalents was necessary if the efficiency system was to be maintained in the long run.²⁸ This requirement was further reinforced by virtue of the specialised techniques and procedures adopted by the efficiency engineers and the resultant incomprehensible (to any but efficiency engineers) nature of the efficiency engineer's records.²⁹

Emerson suggested that since such store was placed on cost data verified by the accountant, any cost savings required the formal recognition of the accountant before management would be convinced of the worth of efficiency engineers.³⁰

The role of accounting and the accountant

Emerson repeatedly stated that the function of the accounting system, and the accountant, was to ascertain and record the incurred costs of production in a way that would provide 'proof' of the

cost savings achieved by the efficiency engineers. The achievement of those efficiency results was the exclusive function of efficiency engineers.³¹

The accounting records were to be based on standard costs developed by the efficiency engineers, and the variance from standard (the difference between standard and the actual cost) as determined by the accountant. From these records comparative cost statements were to be developed which would demonstrate the progress of the efficiency engineer in eliminating 'avoidable waste'.³²

The accountant then had a relatively minor part to play in the achievement of efficiency objectives. He was (a) to provide the efficiency engineers with the incurred costs of production for the immediate past period, and thus aid them in the determination of 'allotted wastes'; and (b) to demonstrate the results of the cost saving work of the efficiency engineers.³³

While maintaining that the efficiency records were independent of the accounting processes, he observed that the utilisation of the same basic data by accountants and efficiency engineers, in

²⁷Harrington Emerson, 'The Realization of Standards in Practice', pp. 172-178. Before the efficiency engineers began their work, management was to be presented with a report that would indicate the '100 per cent efficiency' cost of operations and the 'avoidable waste': the difference between the standard and current costs. This avoidable waste was to be progressively reduced to zero. In the interim, management would be presented with cost statements highlighting the standard cost, the 'allotted waste': that part of the 'avoidable costs' that efficiency engineers estimated they still had to eliminate, and actual costs. In the long term, then, management would be kept informed of the progress the efficiency engineers were making in bringing employees up from, say, 60 per cent to 100 per cent efficiency.

²⁸*Ibid.*, p. 175: 'Standard practice propositions are generally wrecked on the fact that to secure a net reduction of 40 per cent as to the whole, the cost of direct supervision is increased'.

²⁹Harrington Emerson, 'The Modern Theory of Cost Accounting', p. 346: 'The efficiency engineer establishes new measures, new methods of comparison unknown either to operating officials or to accountants'.

³⁰Harrington Emerson, 'The Efficiency System in Operation', p. 815: 'The reduction of cost is an efficiency result compared to which the method of stating it in the accounts would be unimportant, were it not that the ability to follow efficiency methods and to convince others of their value and effect depends largely on clear and easily understood statements, and these statements are difficult to obtain and do not carry weight unless at some point they are certified by the accountants, and thus tied into the official expense reports'.

³¹For example, Harrington Emerson: (1) 'The Modern Theory of Cost Accounting', pp. 341, 342: 'In accounting the auditor is responsible for correct cost statements as to every item of expense, and the efficiency engineer is responsible for correct cost attainment—namely 100 per cent efficiency as to every service, material issue, or equipment operation', and again, p. 343: 'It is the business of the efficiency engineer to eliminate wastes, and it is the business of the auditor to carry the accounts in such a manner as to record the results of the efficiency engineer'. (2) 'The Localization and Elimination of Wastes', p. 678: 'Efficiency engineers have also found to their sorrow, that unless allotted costs are tied into current costs by the comptroller it is impossible to attain accuracy in their statement, and there is no available proof to convince those on whose support they must rely that the methods used are really producing the results promised'. See also, 'Standards: Their Relations to Organization and to Results', pp. 35, 36; 'The Modern Theory of Cost Accounting', p. 341: 'Typical Inefficiencies and Their Significance', p. 530. Solomons, *op. cit.*, p. 41 noted that 'proof' of the efficiency engineers' work was the reason Emerson advocated the inclusion of incurred costs in the accounting system.

³²Harrington Emerson, 'The Realization of Standards in Practice', p. 174. Emerson stated that in the particular case he was using, management had set a time limit 'within which the reduction was to be accomplished'; 'The Modern Theory of Cost Accounting', p. 344: 'To attain 100 per cent efficiency—\$0.06 a mile [in this particular case]—and to record the downward progress from \$0.10, are respective duties of the two staff officers, efficiency engineer and auditor'; and at p. 346: 'The measuring appliances and methods of the standard-practice engineer, innumerable in their variety, are invented and applied so as to test and gauge efficiency. As to all his own measures he seeks the co-operation of the accountant, without whose figures it is impossible to record definitely and reliably the progress made, or the reverse'.

³³'The Modern Theory of Cost Accounting', p. 342: 'What is the cost of locomotive repairs per mile? What should be the cost of locomotive repairs per mile? The auditor answers the first question.'

their respective roles, would simplify the administration of the efficiency records and decrease administrative costs.³⁴ The efficiency system was required to generate data on the extent to which employees were working to standard. The accounting system was required to record both standard and incurred costs of production. Records maintained in terms of standard hours allowed and actual hours worked could then be utilised by both the accountant and the efficiency engineer.

Emerson considered it desirable that the two information systems remain in close contact. However a divergence would occur as the efficiency engineers implemented the appropriate measures in progressing towards the ideal of '100 per cent efficiency'. The accounting records would remain out of phase with the efficiency records until the efficiency engineer advised the accountant of the adjusted figure for standard, and its appropriate dollar equivalent.³⁵ Once again however, he reaffirmed that it was the efficiency records that were instrumental in the attainment of efficiency results, and, whether or not the accounting system provided any administrative assistance, the efficiency engineers would be unhindered in the achievement of efficiency gains.³⁶

A fairly clear picture of the role of the accountant in the accounting system is emerging: to provide documentary support and accurate, verified reports of the cost savings achieved by the efficiency engineers. Emerson, however, recognised that the accounting system had one important and unique role to play in the attainment of efficiency results. He drew a very clear and rigid separation between the staff and the line function.³⁷

Efficiency engineers performed an independent staff function in prescribing methods of improving efficiency. Under some circumstances the improvement of that efficiency required not only a change in the methods of production but also the hiring or firing of certain employees, and the replacement of inefficient plant. The efficiency engineers did not have the responsibility for such decisions. It was a line rather than a staff function.³⁸ The achievement of efficiency, then, was dependent to some extent on the line making the correct decision. Emerson acknowledged that the efficiency engineers' function was so specialised that data generated by the efficiency records were not universally understood.³⁹ He also stated that unless data were coded in cost terms and had passed through the accounting process it tended to be disregarded or, at least, neglected.⁴⁰ It was the function of the accounting process, then, to present to the appropriate line officer cost data that would promote the correct decision by demonstrating which plant involved the lowest standard cost, and the cost incurred by the employees who constantly failed to operate at standard efficiency.⁴¹

Summary

The rôle accounting had to play in the attainment of efficiency could perhaps be considered as substantial though largely cosmetic. Certainly it had no action-inducing quality with respect to the determination and elimination of inefficient operations, even though it was the vehicle by which

³⁴Harrington Emerson, 'The Strengths and Weaknesses of Existing Systems of Organization', p. 920: 'Both accounting and records are very greatly simplified when connected up with standards'. However Emerson made it clear that, while the accounting system did provide an existing structure by which efficiency records could be maintained, 'This does not imply that records or standards shall be an outgrowth of accounting' but rather that 'Standards are wholly distinct from accounting', pp. 918, 919. In 'The Efficiency System in Operation', pp. 818, 820, 822 he suggested that 'the same amount of tabulated information will cost less if based on and built up from these requisitions than if secured along independent lines', and provided an example of requisition forms containing data on both actual and standard material, and labour usage that could be used for both the efficiency and accounting purposes.

³⁵Harrington Emerson, 'The Efficiency System in Operation', pp. 815, 816; and 'The Modern Theory of Cost Accounting', pp. 342, 343.

³⁶Harrington Emerson, 'The Efficiency System in Operation', p. 816.

³⁷Harrington Emerson, 'The Strengths and Weaknesses of Existing Systems of Organization', p. 912.

³⁸Harrington Emerson, 'The Modern Theory of Cost Accounting', p. 345: 'When it is stated that an efficiency engineer brings about improvements it is to be remembered that he is a staff officer—that he merely provides standards for officials to follow—that he may indeed establish a standard of 60 per cent efficiency below which no man ought to be permanently retained in the service of the company, but being a staff officer he will not directly discharge an employee, although the efficiency standing is only 10 per cent. Discharge is the prerogative of the line officer'. With respect to the use of an uneconomical locomotive he declared 'neither the auditor nor the efficiency engineer has the right to order the uneconomical locomotive out of service'.

³⁹*Ibid.*, p. 346.

⁴⁰Harrington Emerson, 'The Efficiency System in Operation', p. 815.

⁴¹Harrington Emerson, 'The Modern Theory of Cost Accounting', p. 338. Emerson noted that line officers based their decisions on cost data, and provided an example which illustrated the misleading nature of data based on actual, rather than standard, costs. In 'The Location and Elimination of Wastes', p. 678, he pointed out that unless standards and variance from standard costs were included in the accounting reports there would be no record of the loss incurred because an employee either destroyed 'valuable material or continuously kills time'.

data on the results of the efficiency engineer's efforts to this end were conveyed to management. The accountant's major contribution to the achievement of efficiency was to ensure that management was provided with cost data which would enable them to identify and compare the relative efficiency of operating equipment and make correct decisions about personnel changes.

Emerson was concerned with the development of an information system relevant to the achievement of scientific efficiency objectives. While there may be some doubt as to the co-operation necessary and/or possible between the two separate disciplines, he repeatedly affirmed that it was exclusively the efficiency engineer's function to determine and eliminate wastes. The accounting system was to provide a record of the progress the efficiency engineers were making in the elimination of those wastes. As such, Emerson advocated the development of a 'new' accounting data pool based on the systematic recording of the standard, and variance from standard, costs. The periodic reduction of that variance would represent the efficiency engineer's progress in terms that were both understood and respected by management.

While Emerson did not identify the accounting system as a prime determinant of non-efficient activities, the system still had a valuable role to play in the achievement of efficiency. It was to provide the efficiency engineer with:

- (a) a record of the incurred costs for the immediately preceding period and thus facilitate the determination of 'allotted wastes';
- (b) the existing structure for the systematic recording of efficiency data; and
- (c) the vehicle by which the efficiency desirable alternatives, identified by the efficiency engineers, were to be communicated, and substantiated, to line personnel.

Conclusion

Solomons has suggested that in the 30 or 40 years following Emerson's pioneering work no more than an elaboration and consolidation of accounting technology occurred. It does appear, however, that significantly more than an elaboration and consolidation of accounting objectives occurred during that period. If standard cost accounting and variance analysis are used today

to generate information about employee performance, it is not because they were originally developed and charged to do so.⁴² While accounting was discharging its function of reporting on the performance of the efficiency engineers (not the employees that those efficiency engineers were attempting to direct and motivate) it did not require the formulation of behavioural assumption, or any adjustment of those assumptions as the industrial and social environment changed. After all it was simply performing its traditional stewardship function with respect to a select area of its operations: the activities of the efficiency engineers.

The behaviouralists' criticisms of the use of standard costing and variance analysis, while justified in the context of the current usage of those accounting techniques, cannot be considered as an indictment of the accountant's lack of foresight or narrow vision when formulating such techniques. Caplan postulates that 'that these [behavioural] assumptions have not been explicitly stated in the past suggests that either accountants have felt no need to define their role in such terms or they have been unable to do so.' It is the conclusion of the present writer that no such assumptions were necessary for the successful implementation of standard costing and variance analysis in their original form.

If the modern usage of the techniques of standard costing and variance analysis as motivational and control devices is deficient because of the lack, or neglect, of appropriate behavioural assumptions upon which their use rests, this deficiency can be traced to the evolution of the techniques and their application to 'solve' substantially different problems over time. At the time of their introduction into formal accounting records no such behavioural assumptions were necessary since their primary function was to provide the financial proof of the activities of efficiency engineers. However, this technology, in the hands of accountants, was subsequently applied to the satisfaction of other objectives.

⁴²As pointed out in footnote 17, Wells comes to substantially the same conclusions about the accounting systems' extensive, and inappropriate, use of allocations in the development of performance measures, viz: that allocations were a part of an accounting system whose purpose was to satisfy objectives significantly different from those currently espoused. Since there was no change in the use of allocations commensurate with the change in objectives, accounting systems now aspire (unsuccessfully) to service objectives other than those for which they were designed.

Addendum

This article was first accepted for publication early in 1978. In the intervening period a number of studies examining the development of management accounting have been published. Interested readers should refer particularly to M. C. Wells' excellent book *Accounting for Common Costs* and the accompanying annotated

bibliography* as the most comprehensive treatment of the literature yet published.

*M. C. Wells, *Accounting for Common Costs*, Center for International Education and Research in Accounting, University of Illinois, 1978.

M. C. Wells, *A Bibliography of Cost Accounting—Its Origins and Development to 1914 Part I and Part II*, Center for International Education and Research in Accounting, University of Illinois, 1978.

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Asset Valuation and Depreciation under Current Cost Accounting

F. A. Bailey

Introduction

The calculation of net current replacement cost (NCRC) of fixed assets presents some interesting problems which are not adequately dealt with in SSAP16 and the Guidance Notes. The discussion here is limited to assets such as plant and machinery where the normal calculation of NCRC is made by applying a specific price index to the historic cost (HC) figures. This normal calculation assumes implicitly that HC depreciation is appropriate for current cost valuation, subject to review of the expected life of the asset. However, HC depreciation is a convention, adopted with little reference to valuation theory. The concept of value to the business, of which NCRC is a major application, defines the depreciated value and therefore defines an appropriate depreciation policy. The policy adopted for HC is not necessarily appropriate for current cost statements. The theory of value and depreciation has been developed by a number of writers, see for example, Wright (Parker & Harcourt, 1969) and Merrett & Sykes (1973). Examination of the theory shows that, in the absence of inflation, an appropriate depreciation policy based on HC which correctly anticipates obsolescence will write down the asset to NCRC without further adjustment.

Obsolescence is an important factor in determining asset life and depreciation. Plant obsolescence occurs when the services provided by the existing plant can be provided more economically; a new machine costs less than the old machine or has lower operating costs or some combination of the two factors. The existence of the lower cost asset reduces the value of the existing asset. If the cost differential is sufficiently large the existing machine should be replaced.

If anticipated obsolescence is taken into account in determining depreciation policy then the written down value of the asset will take into account specific price changes which are expected to occur. A specific price index appropriate to these assets will take into account actual price changes in the asset. Thus the index adjustment used to transform HC to NCRC involves an element of double counting. If obsolescence is not

taken into account in depreciation policy, the use of a price index which reflects only the effect of actual changes in capital costs will not be sufficient. Changes in operating costs are also a factor in valuing the asset. It is true that an index may attempt to adjust for changing technology and so incorporate an allowance for reduction in operating costs. Even so the index adjustment is not an appropriate replacement for the incorporation of obsolescence into depreciation policy, because the index only deals with actual cost changes whereas the depreciation calculation should take account of expected cost changes.

An attempt is made in the following discussion to throw some light on the main aspects of the problem of calculating NCRC by using a number of simple examples.

The valuation process

The full valuation process implied by the concept of NCRC is the method of valuation which is recognised to be necessary in the case of a 'modern equivalent asset' but which is also generally applicable to all depreciating assets. It involves the comparison of two cash flow streams:

- (a) the expenditure which is incurred if the existing asset is replaced by a new asset, including both initial capital cost and subsequent operating costs;
- (b) the expenditure arising from the operation of the existing asset.

The differences between the two streams are discounted to present value and summed. This amount is the loss which the business would suffer if it were deprived of the existing asset. Alternatively it is the benefit which it gains because it possesses the asset. It is therefore the value of the asset in its depreciated form.

In practice the calculation is likely to be a difficult one, and is made more difficult by the fact that the two streams overlap and compel consideration of subsequent replacements. In order to concentrate attention on the essential features of the valuation process and its implications the

examples which follow are highly simplified. In particular it is assumed that the life of the asset is known, whereas the valuation process is necessary to determine the optimum economic life. It is assumed that there are no operating costs, only initial capital costs, and that in each case there will be a continuing series of replacements. On this basis appropriate valuation formulae have been derived (see the appendix) and applied in a series of examples.

Example 1

A machine costs £10,000 and has a life of two years. It will be replaced by a similar machine. No price changes are expected and the cost of capital is zero.

This is clearly not a case involving a modern equivalent asset but by using the comparative cash flow method the asset is valued at £5,000 at the end of year 1. It declines in value by equal annual instalments, which seems sensible.

Obsolescence

Example 2

Because of technological change it is expected that the cost of replacement machines will decline by 5% per annum, i.e. the first replacement (after 2 years) will cost £9,025 and so on. In this case the introduction of the modern equivalent asset will cause the value of the existing asset to decline more rapidly. The decline in value in the second year will be 5% less than the decline in the first year.

Value to the business at end of year 1 is £4,872
(See Appendix E)

Decline in value in year 1 is	£5,128
Decline in value in year 2 is	£4,872

It is noteworthy that for an asset bought at the end of year 1 for £9,500 (5% less than the price at the beginning of the year) the amounts are all 5% less.

Value to the business at end of year 2 is	£4,628
Decline in value in year 2 is	£4,872
Decline in value in year 3 is	£4,628

Thus the decline in value in any year is the same for both a new and an existing asset (£4,872 in year 2). If decline in value is interpreted as depreciation, the depreciation calculated in this way is always current cost depreciation without further adjustment. Whilst this does not hold in a more realistic example involving operating costs it still remains true of the total costs in any year,

i.e. the valuation process equates the costs of new and old assets in any year.

Example 2 illustrates the effect of anticipated obsolescence on value. Although introduced as an example of the modern equivalent asset the same calculations would be made whatever the cause of the price changes. New technology in the process of manufacturing the machines which produced the same machines at a lower price would lead to the same valuations.

Inflation

One factor has so far been omitted. Price changes which have to be dealt with in the normal course arise mainly because of decline in the value of money. One might argue that in many cases there is a tendency for prices to increase because of inflation but that this is partly compensated by the effect of new technology. In rare cases, such as computers, the technology effect overcomes the inflation effect and produces a fall in price but in general we have to deal with increasing prices.

Price increases, due to inflation, do not affect the calculation of 'value to the business'. They complicate the examples by making it necessary to introduce the cost of capital. If the real cost of capital is zero the money cost will be positive. Value may be calculated from the money cash flows or the real cash flows but if money cash flows are used the money cost of capital must be used.

Example 3

Assume that the fall in price of the machine in example 2 is expected to be compensated by an equal amount of inflation so that the price remains constant. The money cost of capital equals the rate of inflation which is 5.26%.

Value to the business at the end of year 1 is £5,128 which is greater than the value in example 2. Because the price is expected to remain constant the total cost in each year, including the cost of capital, remains constant:

Year	1	2
Decline in value	4,872	5,128
Cost of capital		
(5.26% of £10,000)	526	
(5.26% of £5,128)		270
Total cost	<u>£5,398</u>	<u>£5,398</u>

The relationship with example 2 can be seen more clearly if it is recognised that in that

example prices were expressed in terms of money values at the beginning of the period, i.e. in real values excluding inflation. The written down value of the asset in example 2 at the end of period 1 may be converted to the price level at the end of period 1 by means of a general price index adjustment:

Thus $£4,872 \times 1.05263 = £5,128$

which is the value calculated directly in money terms in example 3.

It is noteworthy that no adjustment for specific price changes is necessary. The application of a specific price index to the depreciated value of the asset would produce the wrong result. The reason is fairly obvious. The policy of writing down the asset already takes into account anticipated price changes. The only price changes which need to be adjusted are those which were not anticipated. This will tend to change the depreciation policy.

The conclusion which one is forced to draw is that a specific price index adjustment will very rarely be appropriate in connection with depreciating fixed assets. This is another way of saying that the written down value cannot be calculated by applying the HC depreciation policy to the current cost of a new asset, because change in the replacement cost changes the appropriate depreciation policy.

Changes in the depreciated value of an asset may be necessary because:

- (a) unanticipated price changes make the past depreciation policy inappropriate. Correction requires a review of future cash flows to establish the 'current value to the business' and an appropriate pattern of decline in value in the future;
- (b) the original depreciation policy was calculated in real terms. In this case the proper adjustment to the asset value is by reference to a general price index.

Depreciation in the profit and loss account

The previous discussion has been concerned with the value of the asset to be stated in the balance sheet, for which there exists an adequate theoretical basis. When the charge to the profit and loss account is considered it is discovered that no adequate theory exists.

The expressed object of CCA is to charge to the profit and loss account the current cost of the services of the asset. This may be interpreted in

two ways, either:

- (a) the current cost in money terms, or
- (b) the current cost in real terms.

Current cost in money terms is simply the difference between the values of the asset at the beginning and the end of the period. Current cost in real terms requires a general price level adjustment to state both values in terms of the same unit of purchasing power.

It was demonstrated in Example 2 that the fall in value in any period is always current cost. Example 4 extends this to total cost including cost of capital.

Example 4

If the inflation rate in Example 3 is increased to 15.79% the price of the machine increases by 10% per annum.

Value to the business at the end of year 1 is £5,641.

Because the price is rising by 10% p.a. the total costs increase at the same rate:

Year	1	2
Decline in value	4,359	5,641
Cost of capital (15.79% of £10,000)	1,579	
(15.79% of £5,641)		891
Total cost	<u>£5,938</u>	<u>£6,532</u>

A machine bought at end of year 1 will have a similar pattern of costs increased by 10%. The machine will cost £11,000.

Value at end of year 2 is £6,205

Costs in years 2 and 3 are as follows:

Year	1	2
Decline in value	4,795	6,205
Cost of capital	<u>1,737</u>	<u>980</u>
Total cost	<u>£6,532</u>	<u>£7,185</u>

The total cost of the first machine in year 2 is the same as the cost of the second machine in the same year, even though the second machine was bought one year later at a higher price. Thus the change in value is the current cost depreciation.

If the decline in value is treated as depreciation in the profit and loss account, it is clearly in money terms. The total cost is the current cost. Inflation is recognised in the current cost but as

part of the cost of capital instead of in the depreciation charge. If one were to appraise the investment in the first machine in Example 4 on a DCF basis it would just cover all costs including the cost of capital if it earned £5,938 in year 1 and £6,532 in year 2. In this example the cost of capital consists entirely of compensation for inflation because the real cost of capital was assumed to be zero. In the conventional profit and loss account the cost of capital would of course be represented by loan interest and profit. If the depreciation is stated as the change in value of the asset then profit is stated in money terms. If the depreciation is to be restated in real terms then a general price adjustment is required to increase the depreciation charge to £5,938 in year 1 and to £6,532 in year 2. It would then be consistent to reduce the loan interest charge to real terms leaving the profit in real terms.

The theory of CCA does not make it clear which alternative is appropriate. It merely requires that the 'value to the business' of the assets consumed be charged in the profit and loss account. The practice of adjusting for stocks, monetary working capital and gearing implies that the depreciation charge should be in real terms. This requires a general price level adjustment.

Conclusion

Careful analysis of the concept of 'value to the business' shows that the use of specific price indices to revise depreciated values in the balance sheet is unlikely to be satisfactory because anticipated price change is one of the factors which should have been taken into account in calculating the depreciated value. Research into appropriate depreciation policies for different classes of assets is needed in order to provide a proper basis for calculating NCRC. It may well be that the best way of dealing with depreciation is to define policy in real terms and to adjust the results for movements in the general price level. The same analysis shows that the concept of depreciation to be charged in the profit and loss account is not sufficiently well defined but suggests that a consistent treatment would require adjustment by reference to a general price index.

Appendix: Value to the Business

A. Example 1—Constant costs

Value is calculated as the difference between two cash flow streams discounted back to present value.

The sum of a perpetual stream of payments (C) at two yearly intervals discounted at rate r is:

$$S = C + \frac{C}{(1+r)^2} + \frac{C}{(1+r)^4} + \dots$$

$$= \frac{C(1+r)^2}{(1+r)^2 - 1} \quad (1)$$

The value at the end of year 1 of an existing asset with a two year life is the difference between the value at the end of year 1 of a stream starting immediately (replacement at end of year 1) and the value of a stream starting at year 2 (when the existing asset has to be replaced).

$$\text{Value} = S - \frac{S}{1+r} = \frac{r}{1+r} \cdot S$$

$$= \frac{r(1+r)C}{(1+r)^2 - 1} = \frac{(1+r)C}{(2+r)} \quad (2)$$

As r tends to zero the value tends to one half of C .

A similar calculation will show that for a three year life one third of the cost should be written off in each year and so on.

B. Examples 2 to 4—Costs changing at a constant rate

Let the cost in year $t + 1$,

$$C_{t+1} = \frac{C_t}{1+p}$$

so that for positive p cost declines through time.

Then the sum of a discounted stream of costs starting at time zero is:

$$S_0 = C_0 + \frac{C_0}{(1+r)^2(1+p)^2} + \dots$$

Let $(1+r)(1+p) = 1+R$. Then the preceding formulae can be applied directly.

From (1)

$$S_0 = \frac{C_0(1+R)^2}{(1+R)^2 - 1} \quad (3)$$

The value of an existing asset at the end of year 1 (V_1) is dependent on

$$S_1 = \frac{S_0}{1+p} \quad \text{and} \quad S_2 = \frac{S_0}{(1+p)^2}$$

$$V_1 = S_1 - \frac{S_2}{1+r} = \frac{S_0}{1+p} \left(1 - \frac{1}{1+R} \right)$$

$$= \frac{S_0}{1+p} \cdot \frac{R}{1+R} \quad (4)$$

Combining (3) and (4) leads to the valuation

formula:

$$V_1 = \frac{(1+R)}{(2+R)} \cdot \frac{C_0}{(1+p)} \quad (5)$$

C. It can be shown that the decline in value is at a constant rate if $r = 0$

For $r = 0$ the valuation formula (5) reduces to

$$V_1 = \frac{C_0}{2+p} \quad (6)$$

Thus the decline in value decreases in each year at a constant rate

$$\frac{V_1 - V_2}{V_0 - V_1} = \frac{C/(2+p)}{C - C/(2+p)} = \frac{1}{1+p}$$

or

$$V_1 - V_2 = \frac{(V_0 - V_1)}{1+p}$$

D. If $r \neq 0$, the sum of the annual costs—in this case the decline in value plus cost of capital—decreases at a constant rate

$$\begin{aligned} & \frac{V_1(1+r) - V_2}{V_0(1+r) - V_1} \\ &= \frac{C(1+R)(1+r)/(1+p)(2+R)}{C(1+r) - C(1+R)/(1+p)(2+R)} \\ &= \frac{(1+R)(1+r)}{(1+R)(2+R) - (1+R)} = \frac{1+r}{(2+R) - 1} \\ &= \frac{1}{1+p} \end{aligned}$$

or

$$V_1(1+r) - V_2 = \frac{V_0(1+r) - V_1}{1+p}$$

E. Example 2

A price decline of 5% implies that

$$\frac{1}{1+p} = 0.95$$

so that p is approximately 0.0526. The cost of capital (r) is zero. Thus from (6)

$$V_1 = \frac{C_0}{2+p} = \frac{10,000}{2.0526} = 4872$$

Example 3

p is zero but $r = 0.0526$. Thus from (2)

$$V_1 = \frac{(1+r)C}{2+r} = \frac{10,526}{2.0526} = 5128$$

Example 4

A 10% price increase implies that

$$\frac{1}{1+p} = 1.1$$

and p is -0.0909 . The cost of capital (r) is 0.1579 and $1+R = (1+r)(1+p) = 1.0526$. From (5)

$$V_1 = \frac{(1+R)C_0}{(2+R)(1+p)} = \frac{1.0526 \cdot 10,000}{2.0526 \cdot 0.9091} = 5641$$

References

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Uniformity v. Flexibility in the Published Accounts of Local Authorities: the UK Problem and Some European Solutions

Rowan Jones and Maurice Pendlebury

In recent years there has been an increasing trend towards central government regulation of the form and content of the published accounts of local authorities in the UK.¹ The rationale for this is that the Government perceives a need to establish a *more uniform approach*.² In view of this trend we felt it would be useful to consider how widely local authority accounting practices varied, by undertaking an empirical survey of recent published reports. Moreover, we felt that a brief review of the approach adopted by other European countries would add a useful comparative perspective.

Specifically, then, our paper consists of the following three sections:

- (1) A review of the professional and government regulations concerning English local authority accounts.
- (2) Results of an empirical survey of the published reports of 60 English local authorities.
- (3) Results of a survey of other European practices.

Professional and government regulations in England

Concern over the question of uniformity in local authority accounting has a long history. From its very beginnings in 1885, the Chartered Institute of Public Finance and Accountancy (formerly the Institute of Municipal Treasurers and Accountants) has been involved in attempts to achieve

uniformity. (See Butterworth³ for an early review of the position.) In 1913 and again in 1938 the Institute of Municipal Treasurers and Accountants published recommended methods of standardised presentation⁴ and in 1955 its publication *The Form of Published Accounts*⁵ represented a significant advance. The following quotation from this publication well summarises their objectives:

Standardisation, has, therefore, been sought by laying down a standard terminology, a standard framework of presentation, and standard definitions so that the same heads of account may always have the same meanings, but allowing local authorities to present varying degrees of detail (p. 5).

An example of standard terminology and standard presentation can be seen in Table 1, which shows how an operating statement for Primary Education would appear.

An example of a standard definition would be where 'furniture and fittings' are distinguished from 'equipment and materials' on the following basis:

furniture and fittings 'includes only furniture ... attached to premises. Equipment and materials used in the operation of a service are included under equipment, tools and materials.'⁶

¹See, for example, *The Accounts and Audit Regulations 1974*, Statutory Instrument No. 1169, HMSO (1974) and *The Local Government, Planning and Land Act 1980*.

²*Publication of Financial and Other Information by Local Authorities*, A Consultation Document by the Department of the Environment (October 1979).

³Butterworth C. R., 'Abstracts of Accounts', *Financial Circular*, Vol. 10, No. 4 (supplement), April 1906, pp. xxxv-xxxix.

⁴Institute of Municipal Treasurers and Accountants, *The Standard Form of Abstract of Accounts* (1938).

⁵Institute of Municipal Treasurers and Accountants, *The Form of Published Accounts* (May 1955).

⁶*Ibid.*

Table 1.
Example of Recommended Operating Statement for Primary Education

Expenditure

Employees:

Salaries and wages:

Teaching staff

Groundsmen

Cleaners

Others

National Insurance

Superannuation

Allowances

Other employees' expenses

Running Expenses:

Premises:

Repairs and maintenance of buildings

Alterations to buildings

Maintenance of grounds

Fuel, light, cleaning materials and water

Furniture and fittings

Rents and rates

Contribution of renewal and repairs fund

Apportionment of expenses of operation buildings

Supplies, Equipment and Tools:

Equipment, tools and materials:

educational equipment

school stationery and materials

Provisions

Clothing and uniforms

Laundry

.

.

.

etc.

We can see of course that this definition is equivocal but this is entirely intentional and in fact the whole ethos of the publication is supportive of flexibility within a general pattern, as can be seen from the following quotation:

... because the services of local government are so numerous and so diverse, and local conditions and requirements so different, absolute uniformity of classification or rigid prescriptions of principle are impossible to achieve.

The 1955 publication⁷ has since been thoroughly revised and rewritten but without any significant changes being made and consequently this document still remains the basis for a standardised treatment of local authority accounts.

In contrast to this history of self-regulation within the profession the Government published in 1974 a statutory instrument, *The Accounts and*

Audit Regulations, 1974,⁸ which specified certain requirements for the abstract of local authority accounts. The main requirements were as follows:

- (1) The abstract must be prefaced by a statement of the main principles adopted in compiling the accounts, and that statement must draw attention to any significant changes of practice.
- (2) The main principles referred to in (1) above include the following:

- (a) the basis on which debtors and creditors are included in the accounts,
- (b) the nature of substantial reserves,
- (c) the basis on which provision is made in the operating accounts for the redemption of debt,
- (d) the basis on which capital expenditure is recorded in the balance sheet,

⁷*Ibid.*

⁸*The Accounts and Audit Regulations, Statutory Instrument No. 1169, HMSO (1974).*

- (e) the basis of valuation of real property and investment,
- (f) the basis of depreciation provisions,
- (g) the extent to which central administration expenses are allocated over services.

- (3) The abstract should contain audited balance sheets, capital accounts and operating accounts as well as such explanation of the documents as is deemed necessary.
- (4) The abstract must contain a copy of the auditor's certificate.
- (5) The abstract must include corresponding amounts for the previous year.
- (6) When the auditor's certificate has been granted the authority must advertise that the abstract is available for inspection.

In parallel with this new development of Government intervention, the Chartered Institute of Public Finance and Accountancy (CIPFA) produced in 1975 two companion exposure drafts which reviewed the whole of local authority accounting.⁹ The intention was that definitive recommendations would follow from subsequent discussion.

The main thrust of the exposure drafts' recommendations was to introduce accounting requirements more comparable with commercial practice. For example one of the recommendations was that accruals accounting should be universally adopted, which is noteworthy because it appears to be the first time such a recommendation has been made. It is interesting to note that *The Corporate Report*,¹⁰ which was being written at this time, specifically excluded discussion of local authority published financial reports on the understanding that CIPFA were considering the matter. These CIPFA exposure drafts are presumably the result of such considerations although the approach adopted by them is conceptually and fundamentally different.

To summarise, then, the professional and government regulations would seem to indicate that the published accounts of local authorities compare favourably with those of the commercial sector. This is because these regulations provide general guidelines of how appropriate account classifications are to be achieved, and also specify

a standard format for the way in which final accounts are prepared. And yet in spite of this the Government still believes that 'there is a need to establish a more uniform approach'.¹¹

This led us to question two things: firstly, the degree of conformity by individual local authorities to the extant professional and statutory requirements, and secondly, the extent of comparability which these requirements are intrinsically capable of.

The results of our empirical findings are outlined in the next section.

Results of empirical survey

A population of 457 English local authority published accounts was divided into four separate populations, namely:

- (1) Metropolitan Counties (including the Greater London Council)
- (2) Metropolitan Districts (including London Boroughs)
- (3) Shire Counties
- (4) Shire Districts

For Metropolitan Counties we took all the published accounts available (3 out of a total population of 7). For the other three categories we randomly selected the following:

- Metropolitan Districts—18 out of a total population of 69
- Shire Counties—17 out of a total population of 39
- Shire Districts—22 out of a total population of 342

This gives a total sample size of 60.¹² Table 2 contains a summary of the results of the survey.

From Table 2 it seems clear that there are several instances of deviation from professional and statutory requirements. One of the most important of these is that only 28% of our sample had a certificate of audit attached. Of course we realise that because local authorities all report to the same balance sheet date this presents an obvious problem; nevertheless it is

⁹Chartered Institute of Public Finance and Accountancy, *Local Authority Accounting 1. Accounting Principles* (October 1975) and *Local Authority Accounting 2. Finance in Management* (October 1975).

¹⁰Accounting Standards Committee, *The Corporate Report* (July 1975).

¹¹*Publication of Financial and other Information by Local Authorities, op. cit.*

¹²The published accounts used were those for the year ended 31 March 1978 except for six cases where, because of unavailability, the prior or subsequent year was used.

Table 2.
Analysis of the Form and Content of Local Authority Published Accounts

<i>Practices</i>	<i>Type of Authority</i>		<i>Metropolitan Counties</i>		<i>Metropolitan Districts</i>		<i>Shire Counties</i>		<i>Shire Districts</i>		<i>Total</i>	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Statement of Principles	3	100	17	94	17	100	22	100	59	98		
Consolidated Balance Sheet	3	100	14	78	8	47	21	95	46	77		
Individual Balance Sheets	3	100	11	61	9	53	14	64	37	62		
Allocation of Central Administration Expenses:												
Total Allocation	1	33	12	67	11	65	15	68	39	65		
Partial Allocation	0	0	3	17	3	18	6	27	12	20		
Not stated	2	66	3	17	3	18	1	5	9	15		
Level of Accrual Accounting:												
Converted Receipts and Payments	0	0	1	6	2	12	0	0	3	5		
Income and Converted Payments	2	66	9	50	10	59	10	45	31	52		
Income and Expenditure	1	33	8	44	4	24	11	50	24	40		
Not stated	0	0	0	0	1	6	1	5	2	3		
Revenue Account—Level of Aggregation:												
Service	0	0	2	11	4	24	0	0	6	10		
Division of Service	2	66	8	44	7	41	10	45	27	45		
Standard Group	1	33	7	39	4	24	11	50	23	38		
Sub Group	0	0	1	6	0	0	1	5	2	3		
Detail Head	0	0	0	0	2	12	0	0	2	3		
Balance Sheet Presentation:												
Asset Value Net of Depreciation	2	66	1	6	9	53	0	0	12	20		
Gross Asset Value with Depreciation shown as Liability	1	33	17	94	8	47	22	100	48	80		
Performance Indicators	3	100	8	44	11	65	6	27	28	47		
Pictorial Presentation	1	33	5	28	5	29	2	9	13	22		
Narrative Report	1	33	7	39	11	65	9	41	28	47		
Certificate of Audit Attached	1	33	3	17	3	18	10	45	17	28		

equally obvious that unaudited accounts must suffer from a severe lack of credibility.

Other noteworthy examples are that 38% of our sample did not produce individual fund balance sheets, and, perhaps more importantly, 23% did not produce a consolidated balance sheet. Omission of the latter seems particularly important since it means in effect that there is no statement from which the overall financial position of the authority can be determined. Further, even though 98% of our sample did include a statement of accounting principles, 15% did not disclose the extent to which central administration expenses had been allocated and two authorities did not disclose the extent of accrual accounting. But perhaps most significant of all, at least in terms of the lay-

reader's ability to comprehend the published accounts, some 53% of authorities in our sample did not include any narrative report, as required by the Accounts and Audit Regulations.

As far as comparability is concerned, our survey indicates that there are serious deficiencies. Taking once again the example of central establishment expenses, we discovered, as can be seen from Table 2, that, whereas 65% of our sample made a complete allocation, 20% undertook only a partial allocation. An example of partial allocation was the recharging to trading or grant aided services only. But more than that, although the most frequent bases for allocation were 'floor area' for administrative buildings and 'time spent' for staff

expenses, a number of alternative methods were also used. For example, some authorities made special cases of telephone charges, computer expenses and architects' fees, where the recharges were based on actual usage. This combination of different bases and different extent results in a wide variety of treatments. A further example of differing practices is in balance sheet representation of assets: 80% of our sample showed the gross value of assets whereas 20% showed asset values net of depreciation. Similarly, although straight-line depreciation is the norm, there is considerable flexibility in the choice of estimated useful lives over which that depreciation is charged, for even though the government specifies lives¹³ for each category of asset, these are only maxima. Thus a school in one authority could be depreciated over 60 years and another might well use only 40 years.

Turning to the revenue account, we found substantial differences in the level of aggregation. A consequence of this is that whereas for some local authorities it would be possible to determine the expenditure on, say, the salaries of primary school teachers, for others all that would be disclosed would be the total amount of salaries for the whole of the education service.

The absence of performance indicators in 53% of our sample and a pictorial presentation in 78% are further examples of the difference in understandability and comparability of local authority accounts. And although performance indicators must be interpreted with caution, they seem particularly important in this context given that in nonbusiness organisations financial data do not satisfactorily capture measures of output.

Finally, of less importance, but perhaps of some interest, we observed that while 50% of our sample produced abstracts of between 20 and 50 pages, 12% were above 100 with one producing an abstract of as many as 225 pages!

In summary, then, our results show firstly that current local authority accounting practices do not conform to the professional and statutory requirements, and secondly that local authority accounts simply are not comparable.

So far we have confined our empirical survey to local authorities in England. However, as we have pointed out earlier, the desire for uniformity

has existed for certain for almost 100 years and we have just shown that these desires have even yet not been satisfied. Consequently, we feel that, as with many other unresolved problems in accounting, a comparative survey might be useful in introducing a fresh perspective. This we review in the following section.

Survey of other European practices

In an attempt to achieve as broad a coverage as possible in surveying other European practices, we have necessarily had to forsake depth. We felt that this approach was justified because it would enable us to isolate those countries in which future in-depth research might profitably be concentrated. Consequently our survey was limited to a questionnaire which was sent to central government officials responsible for municipal financial affairs in each of the following countries:

Belgium	France
Denmark	Italy
Eire	Luxembourg
Federal Republic of Germany	The Netherlands Sweden

Replies were received from all except Italy. The results of the survey are summarised in Table 3 below.

From the summary, we can pick out a common thread concerning four countries, i.e. Denmark, Eire, the Federal Republic of Germany and France, where all local authorities have to publish an audited abstract of accounts whose form and content is statutorily prescribed and where little or no discretion is left to individual authorities.

Because in the Netherlands the abstract provided for the general public is the same as the data submitted to central government, the uniformity may perhaps be explained in terms of local authorities merely providing macroeconomic statistics. An examination of the macroeconomic data provided to the central government by English local authorities would reveal a similar situation. Therefore further comparison with the Netherlands might, on the face of it, appear to be of limited benefit. On the other hand the situation in Denmark, Eire, the Federal Republic of Germany and France is that information provided for the public is different from that given to the central government. We suggest, therefore, that an empirical survey similar to the one we have already

¹³Department of the Environment, *Circular 66/76* (1976).

Table 3
European Municipal Reporting Practices
Questions

	Belgium	Denmark	Eire	France	Germany	Luxembourg	Netherlands	Sweden
Is an abstract published which is intended for the general public?	No ^(a)	Yes	Yes	Yes	Yes	No ^(a)	Yes	Yes ^(b)
Is the abstract different from accounting data provided to central government?	—	Yes	Yes	Yes	Yes	—	No	No
How much discretion is allowed in the form and content of the abstract?	—	Minor Statutory	None Statutory	None Statutory	Minor Statutory	—	None Statutory	Complete
How is the level of discretion prescribed?	—	Yes	Yes	Yes	Yes	—	Yes	—
Are the abstracts audited?	—	—	—	—	—	—	—	No

Notes (a) Although in Belgium and Luxembourg local authorities do not publish an abstract, the accounts and budgets are deposited each year in the Town Hall where they are available for inspection for a period of ten days; (b) In Sweden there is no requirement to publish an abstract which is intended for the general public but nevertheless many authorities, particularly the larger ones, do produce such an abstract.

undertaken in England should be carried out in these countries, first of all to determine precisely what form the statutory legislation takes and secondly to discover whether and to what extent current practice conforms with this regulation.

Conclusion

The debate over uniformity in the form and content of the published accounts of local authorities has once again been given prominence due to the UK Government's concern that local authorities should produce accounts that are more comparable. In view of this we attempted to ascertain the extent of the problem by surveying the published accounts of a sample of 60 English local authorities. The findings from our sample show that the wide range of accounting practices and methods of financial presentation do result in a serious lack of comparability. Thus, if the assertion that the ability to compare the accounts of one local authority with another is accepted as a requirement of users, then attempts to achieve greater uniformity might seem to be justified.

However, if the move towards uniformity is taken to its ultimate conclusion, then as Morison¹⁴ points out:

Attention would immediately be engrossed by the question 'Are the figures in accordance with the rules?', instead of 'Are the figures in accordance with the facts?'

An example of the consequence of this situation is that not only would there be one, and only one, permitted method for allocating depreciation charges, but also that the life over which an asset could be depreciated would be prescribed as identical for all local authorities. Such a situation would seem to run contrary to the whole ethos of accounting practice in the UK. Nevertheless our survey of the requirements concerning other European local authority accounting practices tends to indicate that at least four countries do adopt something approaching this level of uniformity. (However, as was pointed out earlier, the extent to which actual practice conforms with required practice needs to be established.)

One explanation for this difference in approach could be that local authorities are considered suf-

¹⁴Morison A. M. C., 'The Role of the Reporting Accountant Today' in Zeff S. A. and Keller T. F., *Financial Accounting 1: Issues and Controversies*, 2nd edition, McGraw-Hill (1973).

ficiently homogeneous in these countries to lead them to the belief that completely uniform accounting would not distort economic reality. An alternative explanation might be that account-

ing in accordance with the rules is more important than accounting in accordance with the facts. Such issues could only be resolved by more detailed research.

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Accounting and Auditing Standards: Why They Are Inconsistent

D. Hatherly

This article is exploratory. It begins with an elementary assessment of the factors which determine the quality of a set of financial statements. It then uses this assessment to provide an understanding of the basis on which present accounting standards and the audit reporting standards provide for an assessment of financial statements. It is found that the present accounting and auditing standards appear to be inconsistent with regard to their treatment of uncertainty.

The quality of financial statements

This article is constructed on the idea that the quality of financial statements depends upon two factors which should be considered independently:

- (1) the relevance to decision makers of what is being measured and reported in the financial statements *assuming* that all measurement problems can be overcome.
- (2) the degree of success in measuring that which is reported in the financial statements. It is this degree of measurement success which determines the reliability of the financial statements.

The following definitions of relevance and reliability are drawn from an AAA Statement:

Relevance—Information about an attribute of an object or event is relevant to a decision if knowledge of that attribute can help the decision maker determine alternative courses of action or to evaluate the outcome of an alternative course of action.¹

Reliability—Reliability is that quality which permits users of data to depend upon it with confi-

dence as representative of what it purports to represent.²

These characteristics of relevance and reliability are discussed further in a recent article by Stanga.³ However, Stanga does not discuss the importance of relevance and reliability being considered independently. It should be noted that in this article relevance is considered on the hypothetical assumption that all measurement problems can be overcome (i.e. on the assumption that perfect reliability can be achieved). Hence relevance is considered independently of reliability.

In considering relevance, therefore, the accountant, or perhaps more accurately the Accounting Standards Committee, should ask questions such as: How relevant are the current costs of plant and machinery assuming that current costs can be determined? How relevant is the equity method of accounting for an investment assuming there are no problems in identifying the existence or otherwise of significant influence of the investor over the investee company? How relevant is it to take a percentage of profit on an incomplete long-term contract assuming its outcome can be predicted?

Of course the accountant may be uncertain as to the answers to these questions. In other words he may have difficulty in assessing relevance, even though all measurement problems are overcome. Such difficulties are not considered in this article.

However, assuming that what is reported in the financial statements is regarded as relevant (as defined), what is the degree of measurement success? This is the second factor affecting the quality of financial statements and this factor is affected by different uncertainties which may exist at any stage during the measurement process. For

¹American Accounting Association, Committee on Concepts and Standards for External Financial Reports, *Statement on Accounting Theory and Theory Acceptance* (AAA, 1977), p. 13.

²*Ibid.*, p. 16.

³Stanga K. G., 'The Relationship Between Relevance and Reliability: Some Empirical Results', *Accounting and Business Research*, Winter 1980.

example, consider the following highly simplified, measurement processes:

To measure the current cost of plant and machinery:

- (1) determine historical cost,
- (2) identify an appropriate index,
- (3) multiply by the appropriate index.

To measure an investment (not a subsidiary):

- (1) determine cost of the investment,
- (2) determine whether or not significant influence is exerted,
- (3) if so, add an appropriate percentage of retained profit.

To measure the work in progress on a long-term contract:

- (1) determine costs to date,
- (2) assess outcome of the contract,
- (3) add an appropriate percentage of overall profit.

In each of these examples, an uncertainty arises during the measurement process. In the case of current cost the difficulty is likely to arise at stage 2 in the selection of an appropriate index. The index will be based on a basket of items which only approximates to the make up of the plant and machinery concerned. Hence there is greater uncertainty surrounding current cost measurement than historical cost measurement. In the case of the investment there may be uncertainty, at stage 2, as to whether or not there is significant influence and in the case of the long-term contract some uncertainty is unavoidable, again at stage 2, as to the final outcome of the contract. The extent of uncertainties at any stage during the measurement process reduces the degree of measurement success.

The importance of both factors

Both factors (relevance and measurement success) must be present to produce quality financial statements. For example, it is little use providing information which is highly uncertain due to measurement problems and equally there is no point providing information which is certain if such information is irrelevant to the needs of the financial statement users.

As a shorthand during the remainder of this article the quality of financial statements is symbolised by Q and a measure of this quality is referred to as a Q score. Similarly, a measure of

the uncertainty attaching to the financial statements as a result of measurement problems is referred to as a U score and a measure of the relevance of the statements (assuming certainty) as an R score. In terms of this notation, the previous paragraph states that a low Q score is associated with either a high U score or a low R score.

Application to accounting standards

If these ideas are applied to accounting standards it is seen that the application of a particular standard can give rise to widely differing Q scores (it gives rise to statements of widely differing quality) in differing circumstances. Two examples relating to SSAPs 1 and 9 serve to illustrate the point.

SSAP 1: treatment of associated companies

The principle behind accounting for associates is that the equity method of accounting for investments should be used whenever the investor exerts a significant influence over the affairs of the investee company. For purposes of the discussion in this article this principle is accepted and all accounting information which adopts this principle is, therefore, regarded as having a high relevance measure (R score). One of the main sources of evidence as to whether significant influence is exerted is the size of the shareholding. At the time of writing, SSAP 1 assumes, and ED 25 contains a rebuttable presumption, that significant influence cannot be exerted when the shareholding is less than 20%, and there is a strong presumption in both SSAP 1 and ED 25 that a shareholding of more than 20% implies significant influence. Consider the following three different circumstances:

- (1) a shareholding of 2%, (2) a shareholding of 21%, (3) a shareholding of 48%.

Further assume that, as far as the investor is concerned, in each case the materiality of the shareholding is the same. For example, in the first case the shareholding might be in a very large company, in the second case the investee might be a medium sized company and in the third case a very small company. It is likely that following SSAP 1 or ED 25 the second and third, but not the first, investee companies would be treated as associates. If so, then the quality of the account-

ing treatment in each case is summarised below:

	<i>Treated as associate?</i>	<i>U score</i>	<i>R score</i>	<i>Q score</i>
Case 1	no	low	high	high
Case 2	yes	high	—	low
Case 3	yes	low	high	high

In the first case it is virtually certain that there is *no* significant influence and therefore there are no uncertainties at any stage during the measurement process (a low U score). In the third case it is reasonably certain that there is significant influence and once again there is little uncertainty during the measurement process. In both these cases the financial statements achieve a high Q score, because a relevant accounting principle has been adopted and there is little uncertainty during the measurement process. In the second case, however, there is likely to be uncertainty as to whether or not the investor exerts significant influence. This uncertainty during the measurement process causes a high U score and given that there is a high U score a low Q score is inevitable in case 2 regardless of the relevance measure. When the standard suggests an arbitrary cut off point such as 20% what it is really saying is that for shareholdings around the 20% mark there is uncertainty. This uncertainty cannot be removed by the inclusion in a standard of arbitrary accounting rules or rebuttal presumptions.

SSAP 9: treatment of long-term contracts

Compare the application of this standard to three different long-term contracts:

- (1) a contract 5% completed, (2) a contract 50% completed, (3) a contract 95% completed.

The principle behind the treatment of long-term contracts in SSAP 9 is that the appropriate percentage of the estimated total profit on the completed contract should be taken each year. For purposes of the discussion in this article, this principle is accepted and all accounting information which adopts this principle is, therefore, regarded as being relevant (a high R score). However, SSAP 9 stipulates that profit should only be taken if the outcome of the contract is reasonably certain. Hence, although the appropriate percentage of profit is likely to be taken in contracts 2 and 3, it is unlikely to be taken in the first contract.

Following this article it is suggested that the relevance of accounting information should be

judged on the assumption that there is no uncertainty of measurement even if this is actually far from realistic. Since inclusion of 5% of the total profit on contract 1 would be relevant if perfect knowledge of the outcome were available (the reason why SSAP 9 requires its exclusion is the uncertain outcome), it follows that the R score of an accounting treatment which does not take profit on such a contract is low and consequently the Q score is also low. If SSAP 9 was not followed and profit were to be taken on the first contract then the R score would be high, but the U score, reflecting the uncertainty surrounding the contract, would also be high, causing once again a low Q score. It is seen that a low Q score is inherent in any accounting treatment of a highly uncertain situation.

The U, R and Q scores of the information about the three contracts given in accordance with SSAP 9 is summarised as follows:

	<i>Profit taken?</i>	<i>U score</i>	<i>R score</i>	<i>Q score</i>
Contract 1	no	—	low	low
Contract 2	yes	medium	high	medium
Contract 3	yes	low	high	high

Whatever the U score of the accounting treatment of contract 1, its Q score is held back by the low R score. Contract 2 is less complete than contract 3 and for this reason is likely to be more uncertain. This is reflected in a medium U score and in turn a medium Q score.

The U, R and Q scores of a set of financial statements as a whole are, to a significant extent, a reflection of the cumulative effect of the U, R and Q scores of the pieces of information within those financial statements. The two examples given (SSAPs 1 and 9) show how the U, R and Q scores of pieces of information (about shareholdings and incomplete contracts) can vary when the same accounting standards are applied in different circumstances.

It follows that two sets of statements can both comply with the same accounting standards, both give a true and fair view in terms of the current use of the phrase, and yet be two sets of statements of very different quality (i.e. different Q scores).

Forming and communicating an opinion

Whilst it is the responsibility of the directors to produce high quality financial statements, the role of the auditors is to perform an independent assessment of the quality of those financial state-

ments and to communicate that opinion. There are four quite different approaches to the formation and communication of an opinion on a set of financial statements:

- (A) An assessment can be made of the individual Q score of a set of statements against a standard Q score applied universally to all financial statements and the findings reported.
- (B) An assessment can be made of the individual Q score of a set of statements against a standard Q score specifically set for the circumstances of those individual statements, and the findings reported. Such a specific standard score would, for example, make allowances for any unavoidable inherent uncertainties present in the financial statements.
- (C) Separate assessments can be made of the individual U and R scores of a set of statements against standard U and R scores applied universally to all financial statements, and the findings reported.
- (D) Separate assessments can be made of the individual U and R scores of a set of statements against standard U and R scores specifically set for the circumstances of those individual statements, and the findings reported.

The four approaches (A, B, C and D) are summarised in figure 1.

	Make an assessment of U and R individually	
Against a universal standard score(s)	A	C
Against a specific standard score(s)	B	D

Figure 1

Accounting and audit reporting standards

It has been shown that the application of an accounting standard in different circumstances results in different Q scores. The accounting standards programme as currently pursued, therefore, would appear to set a target Q score for a particular set of circumstances as the basis for an assessment of those financial statements. If there are measurement problems inherent in any given

situation then the required Q score is reduced. The standards programme, therefore, approximates to method B as the basis of forming an opinion on financial statements.

The position of the audit reporting standards, however, is different. The auditing standard 'Qualifications in Audit Reports' suggests that two characteristics of financial statements should be measured separately and reported by the auditor:

- (1) the extent of any disagreement which the auditor has with the view given by the financial statements.
- (2) the extent of any uncertainty which prevents the auditor forming an opinion on the statements.⁴

If the auditor considers there is sufficient uncertainty attaching to the accounts then he qualifies under (2) above, except that any uncertainty which has been the subject of a definitive (though possibly arbitrary) treatment in an accounting standard is not intended to prevent the auditor from forming an opinion on the financial statements. Whatever the level of uncertainty, the auditing standard intends that an unqualified opinion should be given where accounting standards have been followed (except in exceptional cases).⁵

The effect is that the auditing standard 'Qualifications in Audit Reports' requires two quite different methods for forming an opinion on financial statements in relation to uncertainty:

- (1) where a treatment for uncertainty has been covered by accounting standards, the opinion should relate to whether or not there is compliance with those accounting standards.
- (2) where uncertainty has not been covered by accounting standards, the opinion should relate the measure of uncertainty against a level of uncertainty generally recognised as preventing the auditor from forming an opinion.

In the first situation the method by which the auditor forms his opinion is identical with the method (figure 1—method B) by which accounting standards are used to assess a set of financial

⁴Auditing Standard 103, 'Qualifications in Audit Reports' Paragraph 3. (Issued jointly by The Institute of Chartered Accountants of Scotland, The Institute of Chartered Accountants in England and Wales, The Institute of Chartered Accountants in Ireland, and the Association of Certified Accountants, April 1980.)

⁵*Ibid.*, paragraph 10.

statements. However, in the second situation it is apparent that the level of uncertainty must be separately assessed. Furthermore there is nothing in the auditing standard to suggest that allowance should be made, when considering a qualification, for the particular circumstances of the enterprise and any consequent inherent uncertainty. Indeed inherent uncertainty is suggested as one of the very reasons for qualification.⁶ Hence the qualification decision is made by reference to a universal rather than a specific standard for acceptable levels of uncertainty. It follows that in the second situation, the audit standard is consistent with method C (figure 1) for forming an opinion since it requires: (1) a separate assessment for uncertainty and (2) assessment against a universally applied standard score. The method of forming an opinion on financial statements implicit in the auditing standards is, in this second situation, inconsistent with the method of forming an opinion implicit in the accounting standards.

Conclusion

This article has shown that accounting standards and audit reporting standards are inconsistent since they can be based on two quite different methods of forming an opinion on financial state-

ments. Whereas the audit reporting standard 'Qualifications in Audit Reports' can require a separate assessment of the level of uncertainty, accounting standards, as seen in SSAPs 1 and 9, can provide arbitrary treatments for uncertain situations and thus conceal the existence of uncertainty under the disguise of compliance with a statement of standard accounting practice. In this author's view it is the accounting standards which need to be changed to recognise explicitly uncertainty as a major factor influencing the quality of financial statements and therefore to require the reporting of uncertainty levels in those financial statements: 'Users should be better informed about the uncertainties involved in the preparation of financial statements, and the information required to be disclosed should be expanded to improve the ability of users to identify and evaluate significant uncertainties'.⁷ Financial statement users cannot properly assess the quality of financial statements when deterministic (point estimate) figures alone are given in circumstances of inherent uncertainty. So long as this practice is continued in the accounting standards then the inconsistency between accounting and auditing standards is inevitable.

⁶*Ibid.*, paragraph 8.

⁷The Commission on Auditors' Responsibilities (Chairman: Manuel F. Cohen), *Report, Conclusions and Recommendations*, p. 29.

Walter Taplin Prize

The Association of University Teachers of Accounting, the Council of Departments of Accounting Studies and *Accounting and Business Research* offer a prize of £75 for the best article published in each annual volume. The prize is named in honour of the journal's founding editor, Walter Taplin. The winning article in 1980/81 was 'Distributable Profit and the Pursuit of Prudence' (Winter 1980) by D. A. Egginton.

Simulating Learning Curve Parameter for Managerial Planning and Control

Woody M. Liao

The application of the learning curve model in accounting for planning and control of operations has been a subject of considerable interest in the past ten years. For example, Summer and Welsch [1970] suggest some relevant application of learning in product pricing and in profit planning and control; Bump [1974] discusses the potential uses of learning curves in product-cost evaluation and control decisions; Harvey [1976] extends learning-curve models to planning profit and cash flows and to capital expenditure analysis; and McIntyre [1977] suggests an incorporation of learning effects in Cost-Volume-Profit Analysis. However, as indicated by Baloff and Kennelly [1967], one of the major problems in the application of the learning curve is the difficulty of estimating the model parameters. One of the factors which causes the difficulty is the amount of uncertainty involved in estimating the parameters. Although the importance of this problem has been recognised in the literature [Asher, 1965 and Baloff, 1966] and experienced in practice [Billon, 1966], little has been done to develop a meaningful solution. As indicated by Yelle [1979], academicians as well as practitioners seem to have neglected this problem for the last ten years.

Traditionally, a single estimate of the learning model parameters without consideration of risk or uncertainty is assumed by several estimation approaches and used in practice. However, in many cases an estimation approach which does not consider risk or uncertainty in the estimation of the model parameters may result in misleading information. Recognising the importance of uncertainty in the estimation of the learning curve model parameters, Harvey [1976] and McIntyre [1977] apply sensitivity analysis to assess the effect of errors in the estimation of the learning model parameters on the variable of interest in their studies. Although sensitivity analysis can be used to study the effect of a certain amount of

error in the estimation of a parameter on the variable of interest, it does not provide the pattern of the potential variation of the variable. Furthermore, some meaningful statistical analysis cannot be incorporated in the sensitivity analysis.

The purpose of this paper is to consider uncertainty in the estimation of the learning model parameters and to propose a simulation approach to develop probability distributions for the dependent variable in a learning curve model. Simulation is a powerful tool for managerial planning and control analysis. It has been used in business for several planning and control analyses under conditions of uncertainty. The discussion in this paper is divided into four sections: (1) the learning curve model is briefly reviewed; (2) some of the past estimation approaches are summarised and evaluated in order to select one approach for incorporation with the simulation approach; (3) the proposed approach is presented; (4) an example is developed to illustrate the proposed approach and demonstrate its feasibility.

The learning curve model

Mathematically, the learning effect may be expressed by an exponential function as:

$$Y = aX^b \quad (1)$$

where

Y = productivity,
 X = cumulative units produced, and
 'a' and 'b' are parameters of the model.

The learning curve model in Equation (1) describes the manner in which productivity increases with increasing output throughout the learning period. The model parameter 'a' represents the productivity during the first unit of

output. The model parameter ' b ' represents the index of learning improvement. The parameter ' b ' has a value between the limits of zero and one. When $b = 0$, productivity remains constant and equal to the value of ' a ' for the entire manufacturing process of the product. In this case, no learning effect shows in the manufacturing process. On the other hand, the rate of learning improvement becomes larger as ' b ' approaches one.

Empirical studies have shown that considerable variations in the values of ' a ' and ' b ' appear among companies in an industry and among the projects in the same company [Baloff, 1966]. In addition, Harvey [1976] observes that a small percentage of errors in the estimation of the model parameters results in a significant effect on the level of cost incurred, the cash flows, and the internal rate of return in the capital budgeting problem.

Review and evaluation of past estimation approaches

The most serious problem of applying the learning curve model is the estimation of the model parameters ' a ' and ' b '. It may be argued that a dependable estimate of the ' a ' parameter can be obtained from a qualified engineering study. However, even if this is possible, the estimation of the ' b ' parameter (or the learning rate) remains a more difficult problem. As shown by Billon [1966] even firms with experience in producing similar products experience learning rate estimating errors large enough to produce significant financial planning errors. Some approaches used in the past for estimating the learning model parameters are discussed in this section.

(1) Same Learning Rate for All New Start-Ups in a Plant

Under this approach, the value of the parameter ' b ' is assumed to remain the same for all new start-ups in a plant or industry, regardless of changes in other relevant factors. This approach was quite popular in the aircraft industry at one time. However, it has been demonstrated by Asher [1965] that this assumption is inconsistent with the results of some empirical studies. It is clear that a learning curve found in a manufacturing process may not apply to another manufacturing process in the same plant or industry if the manufacturing process is changed.

(2) Same Learning Rate for Similar Products

Under this approach, the manufacturing processes of similar products are assumed to have the

same rate of learning improvement. This assumption has been proved to be wrong in many cases not only within an industry [Alchian, 1950] but also in a company [Baloff, 1966]. The problem is that changes in labour mix or components, materials used, and other production factors can considerably change the learning effect.

(3) Two-Point Approach

Under this approach the learning model parameters are estimated from an observation of any two points in the manufacturing process. If the data of the two points are plotted on log-log paper, the learning effect will be shown as a straight line. The value of ' a ' is the intercept of the vertical axis. The value of ' b ' is the slope of the straight line. Unfortunately, this approach is crude in that it considers only two points and ignores all other possible points in the manufacturing process. Additionally, in some cases, it is necessary to estimate the learning model parameters before a project or a process starts. For example, in a case of capital budgeting analysis for determining whether the purchase of a machine is justified, the foreknowledge of the estimates of ' a ' and ' b ' is necessary for the calculation of the internal rate of return or the net present value for the project. Therefore, in this case, the approach is not desirable.

(4) Fitting a Function to a Series of Early Production Requirements

According to this approach, the model parameters are estimated from a fitted function based on a series of early production data. This approach seems to be an improvement over the other three approaches. However, it is unlikely that the procedures would yield reliable estimates until rather late in the manufacturing process. Also, the approach suffers from the same problem discussed before for the two-point approach. This approach is not desirable whenever it is necessary to estimate the learning model parameters before a project or process starts.

(5) The Parameter Model Approach

An alternative approach to the estimation of the learning curve model parameters is the parameter model approach which is proposed by Asher [1965] and Baloff [1967]. The development of this approach is based on the results of their empirical studies in the airframe and steel industries. Their empirical studies show that there was a strong negative relationship between the model parameters ' a ' and ' b '. The relationship between

Table 1 Regression Results				
Number of Observations	<i>m</i>	<i>n</i>	<i>r</i>	<i>t-ratio</i>
17	0.3457	-0.2207	0.883	7.27

'*a*' and '*b*' observed by Asher and Baloff suggests that a simple linear regression model may be fitted to their observed data. For example the regression model used in Baloff's study is:

$$\log b = \log m + n \cdot \log a \quad (2)$$

The regression results and the goodness of fit of the regression equation to the data are given in Table 1. As can be seen, the regression model describes the relationship between the learning model parameters '*a*' and '*b*' very well in this case. Therefore, if the value of '*a*' for a new project or process in the industry can be estimated, the regression model can be used to predict the value of '*b*' for the project. For example, if '*a*' is estimated to be 10 for a new project, the value of '*b*' could be predicted in the following way:

$$\begin{aligned} \log b &= \log(0.3457) - (0.2207) \cdot \log 10 \\ &= -0.4613 - 0.2207 \\ &= -0.682 \end{aligned}$$

In this case, '*b*' is equal to 0.208. The learning rate associated with $b = 0.208$ is approximately 87.56%. It should be mentioned, however, that the meaningfulness of the approach depends largely upon the persistence of the relationship between the parameters '*a*' and '*b*' in the model. Also, the application of the approach in practice requires a reliable estimate of the '*a*' parameter.

The proposed approach

The Development

The model parameters '*a*' and '*b*' are the key variables in the learning curve model. In a real-life case, the values of '*a*' and '*b*' are never known in advance with certainty. In other words, they must be estimated from a certain type of study or past experience. It is obvious that, no matter which estimation method is used, the estimation of '*a*' and '*b*' is subject to risk or uncertainty. Unfortunately, all of the estimation approaches used before assume single estimates of '*a*' and '*b*' with the result that the uncertainty associated with the

estimation is not considered. In such a case, the information of learning effects provided for managerial planning and control may be misleading. A solution to the problem is to consider uncertainty in estimation of learning model parameters. Three practical techniques that have been suggested in the literature for consideration of uncertainty in managerial planning and control are: (1) the PERT-like approach, (2) the probability-tree approach and (3) the simulation approach. The approach proposed in this paper is an incorporation of the simulation approach with Baloff's parameter model approach for estimating learning model parameters. The parameter model approach is selected because it provides significant improvement and promise in solving the problem of estimating the learning model parameter '*b*' [Baloff, 1967]. It should be mentioned, however, that the simulation approach can be incorporated with any meaningful estimation approach.

Three major steps required by the parameter model approach for estimating the parameter '*b*' are: (1) to develop the predicting equation from a regression analysis based on the observed data of '*a*' and '*b*', (2) to estimate the value of '*a*' for the new project or process under consideration, and (3) to estimate the value of '*b*' for the new project or process based on the results obtained in steps (1) and (2). As can be seen, a certain degree of uncertainty or risk is involved in steps (1) and (2). Also, the uncertainty from steps (1) and (2) is further introduced into step (3) in the estimation of '*b*'. The following discussion explains why the uncertainty in each step is generated. In step (1), the predicting equation derived from the observed data does not represent the true function but an estimated function of the relationship between '*a*' and '*b*'. Therefore, it is subject to chance variation as is any sample statistic. As a result, the estimation of '*b*' based on the predicting equation is also subject to chance variation. The measure of chance variation in the regression analysis is the standard error of the estimate (S_e). In step (2), the value of '*a*' is estimated because it is never known in advance. The estimation of '*a*' for a future

project or process is obviously subject to a certain degree of uncertainty. In step (3), since 'b' is defined as a function of 'a', the chance variation involved in the estimation of 'a' will be introduced into the estimation of 'b'. As a result, the chance variation expected in the parameter 'b' results not only from step (1) but also from step (2). Since the learning effect is expressed as: $Y = a.X^b$, the resulting variable Y is thus a random variable because it is a product of two random variables, 'a' and ' X^b '.

The Approach

The approach proposed in this paper suggests a simulation approach to generate the value of Y for managerial planning and control. It should be noted that the use of a simulation approach is suggested in this case because (1) learning model parameters 'a' and 'b' are both treated as random variables and (2) the multiplication of two variables with any known type of statistical distribution cannot guarantee a particular form of distribution for the resulting variable. In such a case, the simulation approach can be used to determine, through multiple trials, the nature of the probability distribution that would be difficult or impossible to determine by standard statistical procedures. Therefore, under the proposed approach, the parameter 'a' is treated as a random variable instead of a single value. Also, in the estimation of 'b', in addition to estimating a value of 'b' for each value of 'a', a simulation will be employed to generate a necessary number of the value of 'b'. In other words, there are two simulations used in the proposed approach in estimating the learning parameters. One is used to simulate the value of 'a'. The other is used to simulate the value of 'b'. The simulated values of 'a' and 'b' are then used to generate the distribution of Y for planning and control purposes.

The proposed approach described above for estimating the learning curve model parameters and the learning effect with consideration given to uncertainty may be summarised as follows:

- (1) Develop a predicting equation for 'b' from a regression analysis based on observed data of 'a' and 'b'.
- (2) Generate random numbers for the parameter 'a' based on its statistical distribution.
- (3) Estimate a value of 'b' based on the predicting equation developed in (1) for each value of 'a' generated in (2).

- (4) Employ a simulation to generate a random value for the parameter 'b' based on each 'b' estimated in (3) and the standard error of the estimate associated with the regression equation.
- (5) The simulated values of 'a' and 'b' are finally used to generate the sample of Y based on the learning equation $Y = a.X^b$.

An illustration

For illustrative purposes, a make-or-buy problem is considered in this section. Suppose that a firm is considering whether to make or buy 120 units of a particular item at \$7,300 each. Based on past experience, management of the firm believes that the learning effect is an important factor in this decision problem. It has been estimated by the company's engineering study that the possible labour hours required to produce the first unit fits a normal distribution with a mean of 600 hours and a standard deviation of 30 hours. Other pertinent factory costs are:

- | | |
|---|------------------------------|
| (1) Materials cost | \$3,500 per unit of the item |
| (2) Direct labour | \$10 per hour |
| (3) Labour related costs | \$8 per hour |
| (4) Opportunity cost of diverting factory resources from production of other profitable item(s) | \$4 per labour hour |

According to Asher and Baloff's studies, the relationship between 'a' and 'b' can be described by the following regression equation:

$$\log b = \log m + n.\log a$$

The values of 'm' and 'n' for the regression equation are found by Asher and Baloff to be different in the aircraft industry and the steel industry. This implies that the values of 'm' and 'n' must be developed for every industry. The development of the value of 'm' and 'n' requires historical data of 'a' and 'b'. For our example problem, the values of 'm' and 'n' for the regression equation were estimated from 20 observations of past data of 'a' and 'b'. The results of the regression analysis are:

- (1) The resulting regression equation:¹

$$\log b = \log m + n.\log a$$

$$= \log (0.0392) + (-0.30).\log a$$

¹Common logarithms are used in this paper. In other words, the base for all logarithmic computations in the paper is 10.

Table 2
Frequency Distribution and Cumulative
Probability on Total Costs of Making The Units

<i>Interval (\$)</i>	<i>Frequency</i>	<i>Cumulative Frequency</i>	<i>Cumulative Probability</i>
< 786,000	26	26	0.0026
786,001 – 801,000	229	225	0.0255
801,001 – 816,000	313	568	0.0568
816,001 – 831,000	865	1433	0.1433
831,001 – 846,000	1100	2533	0.2533
846,001 – 861,000	1536	4069	0.4069
861,001 – 876,000	2162	6231	0.6231
876,001 – 891,000	1549	7780	0.7780
891,001 – 906,000	1261	9041	0.9041
906,001 – 921,000	620	9661	0.9661
> 921,000	339	10000	1.0000

- (2) Number of observations = 20
- (3) Coefficient of correlation = 0.92
- (4) Standard errors of the estimate = 0.004

In order to estimate the total costs of manufacturing 120 units of the item, the model parameter 'b' must be estimated. To achieve this purpose, one hundred values of 'a' are first randomly generated. Then, one hundred values of 'b' are generated for each value of 'a' based on the regression equation, the standard error of estimate, and the assumption of normality.

As a result, the total number of 'b's' generated for the example problem is $100 \times 100 = 10,000$. In other words, the sample size of the value of Y in the problem is 10,000. Therefore, a sample of 10,000 values of the total costs of manufacturing the units is generated by a computer program. The total cost ranges between \$780,251 and \$945,506 with a mean of \$865,213 and standard deviation of \$30,860. Table 2 shows the frequency distribution on total costs of some selected intervals. The frequency distribution in Table 2 provides information about the potential variability of the total costs. In this case, some probabilistic measures on the total costs can be obtained by referring directly to the total costs frequency distribution.

For example, since 3,769 of the 10,000 sample total costs of manufacturing the units are greater than the purchase cost of $\$7,300 \times 120 = \$876,000$, the probability that the cost of manufacturing the units is greater than the cost of purchase is 37.69%. It is interesting to note that the information provided by the proposed approach is quite different from the single value estimation

approach. Under the single value estimation method ($a = 1/600$ and $b = 0.267$),² the total estimated cost of manufacturing the units would be \$861,168.³ The problem with the single value estimation method is that it gives no indication of the potential variability of the total costs of manufacturing the units. The proposed approach considers the uncertainty in estimation of the model parameters and provides the information of the variability of the total costs of manufacturing the units.

Table 3 displays the risk involved in the decision of 'make' or 'buy' 120 units of the item. As shown in the table, the chance of indifference or better if the alternative of manufacturing the units is taken is 62.31%. In other words, the probability that the total costs of manufacturing the units are greater than the total costs of purchase is only 37.69%. However, the probability that the costs of

²The value of b is determined as follows:

$$\begin{aligned} \text{since } \log b &= \log (1.82) + (-0.30) (\log 600) \\ &= 0.26007 - 0.83345 \\ &= -0.5734 \\ b &= 0.267 \end{aligned}$$

³The total manufacturing costs under the single value estimation method is determined as follows:

Materials costs	
(\$3500)(120)	\$420,000
Direct labour	
(\$10)(120)[(600)(120) ^{-0.267}]	200,536
Labour related costs	
(\$8)(120)[(600)(120) ^{-0.267}]	160,428
Opportunity costs	
(\$4)(120)[(600)(120) ^{-0.267}]	80,214
Total	<u>\$861,178</u>

Table 3
Expected Value, Standard Deviation, and
Some Probabilistic Measures of Total Costs
of Manufacturing 120 Units of the Item

Expected total costs	\$865,213
Standard deviation	\$30,860
The probability of the total costs of manufacturing the units:	
(a) at most \$876,000 which is the same as the cost of purchase	62.31%
(b) greater than \$876,000	37.69%
(c) less than \$846,000	25.33%
(d) greater than \$906,000	9.59%

manufacturing the units is less than the total costs of purchase by \$30,000 is 25.33%. Therefore, in this example problem, the expected costs of manufacturing the units could be greater or less than the total costs of purchase. In this case, the decision to make or buy will depend upon the management's attitude toward risk. Given the management's attitude toward risk the proper decision could be reached by using probability information in Table 3.

Advantages of the Simulation Approach over the Single Point Approach

The simulation approach considers the uncertainty in estimation of the model parameters and provides a probability distribution of the costs of manufacturing the units. This information of probability distribution of the manufacturing costs is not available under the single point estimation approach. As pointed out in the previous section, the single point estimation approach provides only a single value of the costs of manufacturing the units. Under the single point estimation approach, the make-or-buy decision is thus dependent upon the comparison of the single estimate of the manufacturing cost with the purchase cost. In many cases, this approach may result in misleading information because the potential variability of the manufacturing cost is not considered. The simulation approach considers the potential variability of the manufacturing costs and provides information of the probability distribution of manufacturing costs. Under the simulation approach, the make-or-buy decision is thus dependent upon the comparison of the purchase cost with the probability distribution of manufacturing costs and management's attitude toward risk.

The advantage of using the simulation approach over the single point approach can be

illustrated through the following example. Suppose that the firm's cash flow position is very crucial and a spending over a specific limit on the items under consideration must be avoided. In addition, the management has decided not to accept the alternative of making the units if the probability is more than 9% that the manufacturing cost is greater than the purchase cost by \$30,000. In this case, the simulation approach would recommend purchase of the items. However, the single point approach would recommend manufacturing the items because the single estimate of the manufacturing cost is less than the purchase cost. On the other hand, assume the management believes that the alternative of making the units should be accepted only if the probability is greater than 70% that the manufacturing cost is less than the purchase cost. In this case, the simulation approach would recommend purchase of the items because 62.31% is less than 70%. Again the single point approach would recommend making the items because the single estimate of the manufacturing cost is less than the purchase cost. The problem associated with the single point approach is that it considers only one point of the many possible points of the manufacturing cost. In other words, it gives no consideration to the potential variability of the costs of making the units. The simulation approach provides additional information of the probability distribution of the possible manufacturing costs. This additional information coupled with the management's attitude toward risk can be used to provide more meaningful information for make-or-buy decisions.

Indifference Analysis

Management may also be interested in the following question: If the item may be purchased at \$7,300 per unit, how many units must be manu-

Table 4
Frequency Distribution and Cumulative
Probability on Indifference Points
Mean = 113 units
Standard Deviation = 29 units

<i>Interval Units</i>	<i>Frequency</i>	<i>Cumulative Frequency</i>	<i>Cumulative Probability</i>
< 70	477	477	0.0477
71 - 80	870	1347	0.1347
81 - 90	917	2264	0.2264
91 - 100	1083	3347	0.3347
101 - 110	1530	4877	0.4877
111 - 120	1467	6344	0.6344
121 - 130	989	7333	0.7333
131 - 140	944	8277	0.8277
141 - 150	674	8951	0.8951
151 - 160	399	9350	0.9350
> 160	650	10000	1.0000

factured before the total costs under both alternatives would be equal? In other words, what is the minimum number of units that should be made in order to realise the lower cost of making the item? Table 4 was prepared to answer the question. The table shows the number of units that should be made before the total costs of the two alternatives are the same. It demonstrates the effect of uncertainty in estimating learning parameters on the indifference point between the two alternatives. Under the single value estimation approach, the indifference point would be determined by solving the following equation for X :

$$(7,300).(X) = (3,500).(X) + 600.(X)^{-0.267} .(X).(22)$$

The resulting indifference point is 106 units. Again, the superiority of the proposed approach over the single value approach can be found by comparing the information in Table 4 with the indifference point of 106 units under the single value approach.

Summary and conclusions

Learning has significant effects on managerial planning and control. A major problem in employing the learning curve model arises in estimating the model parameters. Traditionally, a single estimate of the model parameter has been assumed and used in practice. In such a case, the uncertainty associated with the estimation of the parameters is not considered. Risk or uncertainty is an important decision factor in many manager-

ial planning and control problems. This paper has presented a simulation approach to deal with the problem of estimating the learning model parameters under conditions of uncertainty. The use of simulation provides not only the information about the potential variability of the learning effect but also a means to derive probabilistic measures on the variable of interest. The proposed approach provides managers with more meaningful information for planning and control than the traditional single estimate approach.

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The Nakai Family's Bookkeeping System

E. Ogura

'Omi Shonin' merchants of Omi Province

During the Edo period (1615–1865), the Tokugawa Shogunate reigned over all Japan and, under this so-called feudalism, the country was divided into many *Han*, or provinces, each ruled by a *Daimyo*, or feudal lord.

These *Han* were discrete political units and had their own self-supporting economic systems. Occasional inter-*Han* trading in specialised products was conducted under the management of the *Daimyo* themselves. Every *Han* had its own capital city, or castle town, where a large population gathered, forming the base for a consumption economy. Many merchants arose in these towns to supply the needs of the population, among them some rather large, successful merchant houses. By the mid-Edo Period, the Genroku Era, the long years of peace led to an increasingly luxurious life style and the *Han*'s self-supporting economic systems and the officially sponsored inter-*Han* trade were unable to cope with the increased demands of the people. As a result, unofficial inter-*Han* trade, conducted by merchants, began to appear.

The name 'Omi Shonin' is used to refer to the famed traders from the Province of Omi, present day Shiga Prefecture. The Omi Shonin undertook both the official and unofficial trade in the commodity distribution system. Marketing within the castle towns was conducted by merchants from many provinces, including the Omi Shonin, but almost all the unofficial inter-*Han* trade was handled by the Omi merchants from the beginning. In almost every large town and in the many intermediate towns along the transportation routes, many large Omi merchants had representatives or branches. Their methods were more modern and far superior to those of the merchants of any of the other provinces.

The Nakai family and their accounting system

The Nakai Family started its business immedi-

ately after the luxurious Genroku Period (1688–1703), when Genzaemon Nakai, at the age of nineteen, started a small business as a pedlar. By the time he was ninety, he had built up a fortune of one million *ryo*. The largest of these family business combines was the Mitsui Family of Ise Province (present-day Mie Prefecture) and, while not in the same class with the precursor of the present Mitsui Corporation, the Nakai family business was certainly among those of the second rank. The fortunes of the family began to decline at about the end of the First World War, after almost two centuries of prosperity.

The Nakai had very many branches all over Japan with a decentralised business organisation. Each branch was independent, operated by an individual manager appointed by the main branch. These managers were authorised to make day to day business decisions in accord with basic management rules as adopted by the conference of top management. The owner-master, Nakai, lived in the small town of Hino in Omi Province, a country village made up of small farmers and merchant families. The mansion houses of the merchant families were called *Honke*, providing the home for the family of the master and also for young apprentices, still under training or not yet assigned to one of the branches. Once a year, on New Year's Day, a conference of the branch managers was held, where the financial statements of each branch were reported and examined, business affairs discussed, and new management decisions made. Thus, the owner-master retained a centralised management authority controlled by the yearly financial statements. This reasonable and modernised accounting system was established in response to the decentralised business organisation operating in day to day affairs.

This system of bookkeeping was peculiar to Japan and not as exact as the Western double-entry bookkeeping system. The financial statement, the product of the bookkeeping, is divided into two parts: the first is equivalent to the

balance sheet; the second, to the income statement.

We see that the fundamental principle of duplicate calculation of profits is also present in this method of bookkeeping suitable to Japan. There appears to have been no influence from the Western Method, although the consolidation of the financial statements from the branches was done in the same way as in modern consolidation practice. Further, no transfer price was used in recording transactions between branches for purposes of establishing divisional performance appraisal, but rather a percentage of interest on the amount of working capital utilised was charged for this purpose. This interest charged had its effect. Branch managers had to make a margin of profit larger than the interest charged on working capital; in other words, this interest charge functioned as a manager's responsibility-profit plan and also as a performance incentive plan. Thus we can say that the accounting system used by the Nakai family had two aims: the reporting of profits earned by the branches for a given year, and the gathering of data for use in managerial decision making.

The Nakai system compared with other Japanese systems

This peculiar accounting system is now named the 'Nakai Family's Bookkeeping Method' in Japan. Many historical materials, such as accounting reports and ledger books, of the Nakai family are kept in the archives of Shiga University and the author used them in preparing his book, *The Nakai Family's Bookkeeping Method*, in 1962. In this book, the author mentioned that other historical materials proving the use of the same accounting principles may be found and, if so, the title of the book could be changed to 'The Bookkeeping Method Proper to Japan'. Since that time, many accounting reports of the Edo period have been unearthed, among them those of the Mitsui, Konoike, Hasegawa and other merchant families. They consist only of the financial statements of these families; no accounting books or ledgers have as yet been discovered. It is very difficult to reconstruct the bookkeeping method used from the financial statements only. Judging purely from the form of the financial statements, however, it seems likely that the accounting method used was the same as that used by the Nakai Family.

A brief explanation of the Nakai system

The Nakai business operated from 1734 to 1920 and the *Tana Oroshi Ki* (cumulative memorandum of financial statements for the firm as a whole), many complete batches of financial statements from the branches, and quite a few sets of the branch accounting books, all covering the period up to 1861, are available. The branch accounting books are not complete, not covering every branch for every year but rather certain branches for certain years.

A set of these accounting books for a given year consists of many books of different name and design; for example, the Cash Book for recording receipts and payments, the Sales Book for recording sales proceeds, the Purchases Book for recording purchase costs, the Wages Book for recording wage payments, the Customers Book for recording credit sales and calculating the balances of individual customers, a large account book called the *Dai Fuku Cho*, and so on. *Dai Fuku* means celebration or beautification. Every merchant had one of these large books; it seems to have been a symbol of the Japanese method of bookkeeping and was once used to refer to that system. However, the author has chosen not to use the term in the hopes of avoiding any misunderstanding. Before the validity of the old method proper to Japan had been revealed, it was believed that it had been merely primitive and nothing but an impractical means of maintaining a memorandum manual.

In reality, the *Dai Fuku Cho* was the ledger in which all the necessary accounts were recorded. Each department in each branch kept its own records of the day's transactions; the shop sales manager kept the sales records in the Sales Book, the warehouse stock manager kept the records of deliveries in the Purchases Book, the chief manager, in the inner office, kept the records of payments in the Cash Book, at the same time being responsible for overseeing the employees and operating as financial manager.

Every evening, all these men gathered to check the entries of their respective books for the day. Each entry should have had a corresponding entry in one of the other books. When two corresponding entries were found a small red check mark was put next to each. When all transactions had been recorded correctly in the proper books, each entry should have had a red mark next to it. These red marks were symbolic stamps which indicated the name of the book in which the corresponding entry could be found. These books

were not a form of bi-lateral account and the rule of journalising which states that a debit entry must be balanced by a credit entry was not operative. Thus, there was no way to make up a trial balance to examine the correctness of all the entries as there is in the handier Western book-keeping method. Each evening's checking procedure functioned as the trial process used in the Western system. Consequently, the principle of dual entries for transactions was operative among all the entries.

As mentioned above, the *Dai Fuku Cho* had all the necessary accounts in it and was the equivalent of the General Ledger as used in the Western method. Once each month or so, the total amounts for the period were transferred from the individual account books to the corresponding accounts in the *Dai Fuku Cho* ledger.

At the close of each fiscal year, a draft of the closing accounts was prepared. The totals for each account in the ledger book were transferred to the draft, then rearranged into the order used for the financial statement; i.e., the income statement and the balance sheet. This closing process was called *Tana Oroschi*. The financial statement was called the *Tana Oroschi Mokuroku*. The financial statement was prepared by the simple expedient of making a fair copy of the draft of the closing of the year's accounts. It took the form of a booklet of ten or so pages which was submitted to the *Honke* in Omi Province.

The following is a sample of the financial statement. One note before we go on; there were several kinds of money in use at the time. The standard gold coin was called a *ryo*, and that of silver *momme*. The *ryo* was supposed to be accepted at its inscribed face value. The *momme* on the other hand was valued by the weight of silver in it. There were also copper coins called *kan*. The confusion was further increased by the fact that the terms *kan* and *momme* were also used to designate certain weights of silver. Paper money was also in circulation, issued by feudal lords and, in some cases, by large merchant houses or guilds. The *ryo* was part of a quadruple system; i.e., one *ryo* equalled four *bu*, one *bu* equalled four *shu*. Thus, one *ryo* was equal to sixteen *shu*. But silver and copper were counted by the decimal system. Moreover, the rates of exchange were floating almost constantly. All this makes it very difficult to calculate the actual amounts on the statement and the example shown as Figure 1 is a hypothetical one.

Old Japanese documents were written from top to bottom across the page, but the sample is

Figure 1
Sample Financial Statement

(Title Page)	
<i>Tana Oroschi Mokuroku</i>	
(The Financial Statement)	
(Date)	
(Branch Name)	
(Section I)	
(Part 1)	<i>Cost of goods sold</i>
798	Purchase cost of used clothing
827	" from vendor A
308	" from vendor B
296	Miscellaneous purchases
78	Cost of dyeing and sewing
11	Transportation cost
358	Purchase cost from Kyoto branch
744	Cost of used clothing from Hino home office
2,632	Opening inventory
6,052	Total
<u>2,666</u>	Closing inventory
3,386	Cost of goods sold
(Part 2)	<i>Sales revenue against above cost</i>
3,810	Total of sales proceeds
	compared with cost =
424	Gross profit on sales; rate of profit, 12.5%
(Part 3)	<i>Profit and loss statement</i>
424	Gross profit on sales
<u>52</u>	Interest income from home office
476	Total
	compared with
264	Interest paid to home office
100	Share of home office expenses
15	Cash shortage
19	Expenses and supplies
36	Sales discount
<u>31</u>	Inventory shortage
465	Total
Final profit = 11	
(Section II)	<i>General accounts (balance sheet)</i>
2,665	Net worth from home office
	compared with
2,666	Closing inventory
<u>10</u>	Cash balance
2,676	Total
Final profit = 11	

presented in the Western horizontal style. Also, items have been edited and simplified. Explanatory words are given in brackets and do not appear in the original.

The example given is from one of the branches of the Nakai family business, a rather small one as a matter of fact; the largest branch report is much longer than this and amounts to almost fifty pages.

The Nakai principles for closing accounts

General Principle

The general principle is the same as that of Western double-entry bookkeeping. The records of accounts necessary for the compilation of the financial statement were gathered and arranged. For Section I and II of the example given, the formula was as follows:

1. (Purchasing cost + opening inventory)
 – closing inventory
 = cost of goods sold (Part 1)
2. Sales – cost of goods sold
 = gross profit on sales (Part 2)
3. Gross profit on sales
 – sales and general expenses
 = final profit (Part 3)
4. Assets – (opening net worth + liability)
 = final profit (Section II)

Both final profit figures must be the same amount. Profit was measured in two ways: first, by comparing the opening net worth with the closing net worth; second, by comparing cost with revenue. Genzaemon Nakai, the founder of the family business, knew the former formula and used it to keep records of his performance from 1734 to 1745, when the branches began to increase in number. As the number of branches increased, the accounting system was improved, starting about 1755. The system shown above was put into use at that time.

It is interesting to note that the founder, Genzaemon Nakai, developed something similar to what we now call 'capital stock'. He named it *Mo Sho Kin* and defined it as the net worth of each branch plus that of the whole Nakai family. His use of the term in this sense is peculiar to the Nakai group and was not in common use at that time. Others used it to mean something different. In bookkeeping terminology, *Mo Sho Kin* means net worth (total assets minus total liabilities).

Unique Principle

The example given earlier shows two items relating to interest: interest paid to the home office and interest income from the home office. The home office (*Honke*) and the branches are actually segments of the same unit, the business enterprise. This being true, the interest charges must have a meaning different from that we are used to. Each branch was charged a certain rate of interest on the amount of capital which it used during the accounting period: interest paid to the home office. The home office functioned as the financing department of the firm and, when the

capital fund showed a credit for the branch or if it was sent from the branch to the home office, interest was charged to the home office; interest income to the branch. This indicates that interest meant interest on net worth. The amount was added on to the opening net worth. For a clearer explanation, let us return to the example used earlier.

Interest to home office	264	Opening net worth	2,453
Interest from home office	<u>52</u>	Interest charge	<u>212</u>
Net interest charge	<u>212</u>	Accumulated N.W.	<u>2,665</u>

If the financial statement were to be made up according to present day practice, it would be as follows:

Income Statement		Balance Sheet	
Gross profit	424	Asset	2,676
Operating expenses, etc.	<u>201</u>	Opening net worth	<u>2,453</u>
Net profit	<u>223</u>	Net profit	<u>223</u>

Now we can clearly see the principle. The item which the Nakai family called interest is nothing more than an item covering appropriation of surplus. The final profit entry in Section I (i.e. 11) is the excess profit amount over the interest amount; the net worth entry in Section II (i.e. 2665) is the net worth to which interest has already been added. That is to say, each manager of the Nakai group was asked to accumulate an amount of a certain percent of capital on the opening capital leaving whatever excess was left over and above the calculated interest as the profit. What was the purpose of this practice? The interest was actually the profit performance standard for the manager and, because any excess over this interest was the object of sharing profits for the manager, he was given incentive by the standard profit amount (a compulsory capital accumulation and manager's performance incentive plan).

Weak points of the Nakai family method

Naturally, whatever method is used, the conclusions should be the same, but careless mistakes would lead to different conclusions: profit in Section I might differ from that in Section II. As mentioned above, there was no simple, direct way to examine the correctness of entries such as the trial balance of the Western system. The evening



checking procedure itself might have been a proper method for discovering errors but, if there were any carelessness, the conclusion would be in error. Thorough checking of all entries at the end of the year was very troublesome and difficult and not to very good effect. Thus, because of some technical deficiencies, mistakes remained, though these are easy to adjust and correct by following modern double-entry bookkeeping methods.

The important point here is not that they made mistakes, not that their efforts to correct even obvious mistakes were inefficient, not that their methods were clumsy, but that they realised that the results of the two types of calculations should correspond. In this sense, they had actually approached the theory of double-entry bookkeeping and their system was based on logical principles and can be compared with that of Western style accounting.

Undoubtedly, this played an important role in the development of capitalism in Japan, as our distinguished colleagues, specialists in the economic history of Japan, will demonstrate.

It is also interesting to consider those factors which distinguish the Nakai system from that of modern times. For example, their system limited net worth to the net amount of circulating capital. When fixed assets were acquired, their cost was taken off the books and the net worth diminished by that amount. As a general rule, branch managers were responsible only for circulating capital. They were probably also charged with responsibility for fixed assets but only in respect of maintenance and storage.

When did the Nakai system disappear?

Since the author's report to the conference of the Japan Society of Accounting and the Japan Society of Socio-Economic History in 1960, reports of other families' historical materials have

appeared, along with the work of other researchers in this field. It should be noted that the study of bookkeeping methods proper to Japan has no direct relation to or influence on the study of modern accounting but on research in the history of Japanese business concerns. Several authors have presented papers on the subject in the field of accounting and, as was expected, there has been a boom in studies of bookkeeping methods proper to Japan. The accounting books, as historical materials, are very good sources and provide valuable bases for historical studies.

The accounting materials of the Mitsui, Konoike, Hasegawa and other families have come to light one after another. Though these records consist mainly of financial reports only and do not include the actual accounting books, they are valuable. For research into bookkeeping methods, complete sets of books for one year are most necessary and, in this respect, the Nakai family records may be a rare example.

Though the materials of the other families are only financial reports, they do give some indications as to the principles of accounting used, and the author has presented papers on the step concept of the development of bookkeeping methods in Japan.

A bookkeeping method proper to Japan was developed by the middle of the Edo period (around 1700) and continued in use until the beginning of the Showa era (about 1930). It was used by merchants of both large and medium size. The Western method was imported at the beginning of the Meiji era (1870) and was accepted as an academic subject in commercial schools, commercial high schools and even in colleges, but was not accepted or adopted for actual business practice. The first actual use of the Western system was in the new, large industries of a Western type, for example, the shipyards, iron mills, banks, trading firms, and so on.

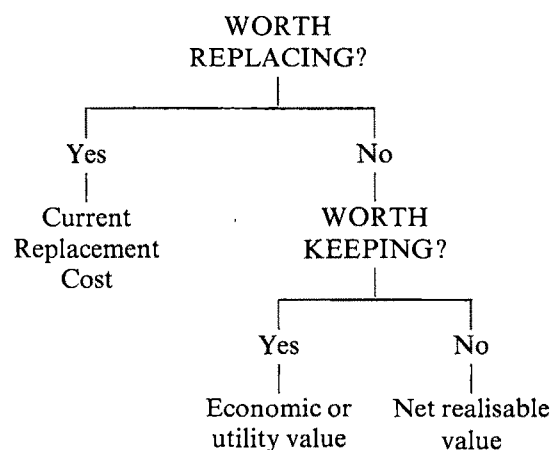
Book Reviews

Understanding Current Cost Accounting. Derek Mallinson. Butterworths, 1980. xviii + 428 pp.

This book is an apologia for SSAP16 rather than an explanation of Current Cost Accounting. SSAP16 is evaluated primarily in, and on, its own terms, with little sign of an independent perspective. The insight provided by the book is therefore meagre, and it can hardly be said to live up to its title. The book comprises two parts: Part One—Understanding Current Cost Accounting (chapters 1–6, 125 pages) and Part Two—Implementing Current Cost Accounting (chapters 7–11, 177 pages).

Part One is, in fact, an attempt to explain the conceptual basis of SSAP16 rather than a conceptual treatment of Current Cost Accounting. All explanations are couched in terms of a 'real physical' concept of capital to be maintained. No mention is made of the alternative approach adopted by Sweeney and by Edwards and Bell, namely, the employment of CCA to calculate a specific-price-adjusted *nominal* business income, combined with the use of a 'real financial' concept of capital to be maintained when calculating a '*real*' business income. Indeed, in many respects Part One is representative of the 'party line' adopted by the professional accountancy bodies and major practising firms on CCA. Thus, it fails to provide needed insights into the conceptual problems of SSAP16 because of an inability to be sufficiently critical of the conceptual fudging underlying certain features of the Standard.

The level of analysis is often facile. For example, a seductive diagram is employed to illustrate the concept of 'Value to the Business':



In fact, when $NRV \geq RC > EV$, a situation in which the item is clearly 'not worth keeping' but may or may not be 'worth replacing', the Standard requires the use of RC. No clarification is offered of the somewhat different implications of the valuation rules for fixed assets and for inventories, respectively. (For example, $NRV \geq RC > EV$ is a normal situation for an inventory item, abnormal for a fixed asset.)

The book reaches its nadir in chapter 2. The style of writing moves into a kind of sub-journal-ese, employing many a facile and tendentious metaphor. This is the SSAP16 'party line' at its most vividly rhetorical. The author's extravagant reifications of 'profit' lead him into the curious posture, on page 25, of castigating historical cost accounting for misleading users of financial statements, while declaring that the Stock Market was able to see through the historical cost profit figures since price earnings ratios 'were plunging to low points not approached since the dark years of the 1939–1945 war'. Far from indicating the need for CCA, the fact that the Stock Market was evidently *not* misled by the historical cost profit figures suggests precisely the opposite. These major flaws are a pity, since Mr. Mallinson includes some quite interesting statistics in this chapter.

Thereafter, the book can only improve. Yet the exposition in chapters 3 and 4 of capital maintenance, monetary items and gearing suffers severely from the fault noted previously—the failure to realise that CCA is not necessarily wedded to a 'real physical' capital maintenance concept, and the associated inability to expose the confusions underlying the SSAP16 Gearing Adjustment. The relationships and distinctions between proprietorial and financial, entity and physical concepts of capital are not explored. Nor are the shortcomings of the 'Godley-Cripps concept' (*sic*), namely, the failure to distinguish between nominal and market values of debt, between fixed and variable interest debt, and thus between nominal balance sheet gearing and income or cash-flow gearing.

Chapter 5, on the legal aspects of 'distributable profit', is useful. Chapter 6, on current purchasing power accounting, predictably suffers when 'gains on borrowing' are discussed.

To sum up, Part One is *not* recommended for readers who wish to understand Current Cost Accounting or even SSAP16. They would do better to turn, for example, to R. S. Gynther's *Accounting for Price-Level Changes—Theory and Practice*, and to the discussion in Appendix C of the US FAS 33.

By contrast, Part Two is a sort of extended Guidance Note. As such, it contains a number of helpful practical explanations. The style, however, is unnecessarily wordy. In addition, the treatment of fixed assets suffers because no analytical model is used to illuminate the discussion. The treatment of stock and working capital is better, but the section on standard costing is not very helpful.

In principle, a new book dealing with the concepts of Current Cost Accounting, written with SSAP16 in mind, starts with some obvious advantages over older literature such as Gynther (*op. cit.*) or Edwards and Bell's *The Theory and Measurement of Business Income*. The flaws of *Understanding Current Cost Accounting* are such as to negate that advantage. It is sad to note that, in addition to his references to the Sandilands Report, the Hyde Guidelines, the Godley and Cripps article, and a word about Goudekot on the use of indices for restating fixed assets, a gifted practitioner of accounting such as Mr. Mallinson is either unable or unwilling to make any mention of the work of earlier writers on the conceptual aspects of CCA. Perhaps he and his peers consider such work academic, and therefore irrelevant. If so, they had better stick to the task of producing technical guidance manuals, and leave the exposition of *concepts* to those who do not suffer from such inhibiting prejudices.

University of Lancaster

Simon Archer

Financial Reporting by Governments. Canadian Institute of Chartered Accountants, 1980. viii + 223 pp. Can. \$22.50.

The Canadian Institute of Chartered Accountants (CICA) has an impressive track record in the publication of research studies. Unfortunately, this recent addition to that list will not receive the attention it deserves. In part, this is a question of the style of the report, but primarily it is because of the introverted nature of its contents.

As regards style, the sheer length of this report is at the expense of readability. The authors have sought to overcome this by providing an index and a numbered paragraph system throughout

the main text. The index is adequate. However, the numbering system for paragraphs, which is so characteristic of report-writing by committees, results in a staccato, disjointed presentation.

Given the poor style, the potential reader must have stimulating contents to maintain his interest. Unfortunately, the contents of this report are likely to have a limited appeal, even to those specialising in the area. CICA has produced a report on Canadian central and provincial governments which is basically aimed at officials engaged in the production of financial reports in these governments. Indeed, the study group which prepared this report was established because of CICA's concern over the possible reforms of governmental financial reporting in Canada and the need for it to be involved in any changes. CICA's proposal to commission this study was welcomed by these governments, whose finance/accounting specialists actively assisted in the research. The end result is a very detailed, specific study geared to a narrow potential readership. However, the issues involved in this report are of concern to a far wider audience. For example: the nature of the accounting entity in governmental accounting; the form and substance of both major financial reports by governments and summarised versions of them; and external audit. Some wider discussion of these topics (for example, by tentatively setting out general principles, or even by seeking to make comparisons with practices of governments outside Canada) would have enriched this study.

Furthermore, the narrowness of the study is emphasised by a bias which is predominantly practical. This is not surprising given the composition of the study group, which consisted mainly of practitioners. Some attempt was nevertheless made to provide a conceptual background to the report. However, this is basically a short review of private sector literature plus a survey of user needs. No details of the nature of this survey, nor its precise results, are published.

Finally, it is important not to be overly critical of this study. The facts are that accountants have had little impact in this area to date and that anything of substance has emerged from North America. In this respect, the CICA study must be welcomed as a useful contribution to a sparse literature. On these grounds, this report could prove to be a significant influence on policy making in Canada. Overall, though, the reviewer is left with an impression of a missed opportunity to make a major contribution to the literature.

University of Edinburgh

Irvine Lapsley

The Evaluation of Risk in Business Investment. J. C. Hull. Pergamon Press, 1980. xiv + 177 pp. £12.00 hbk, £6.50 pbk.

The book is concerned with risks in capital investment appraisals. It is unusual to find a book dealing with risk alone, the preferred course of action being to cover the entire area of capital budgeting, financial management or business finance. A second surprising feature is that the book ignores the capital asset pricing model. However, the author defends this on the grounds (a) that managers still place a high premium on evaluating the total risk in an investment opportunity and (b) that a prerequisite to diversifying away from risk is an examination of the total extent of that risk. I concur with the author's observations. Although the capital asset pricing model has been the favourite academic model in finance, one wonders whether the volumes written about the subject can be fully justified to the practitioner. Recent theoretical developments add fuel to this thought. What is more surprising and a major shortcoming of the book is the casual way the author dismisses cardinal utility theory (covered in 3 pages), portfolio theory and the capital asset pricing model. This occurs in chapter 7. The author might argue that this was not his primary purpose, but the title of the book suggests otherwise.

The structure of the book is that basic DCF techniques are dealt with in chapter 1. Chapter 2 highlights the limitations of sensitivity analysis and gradually develops the theme of probabilistic simulation (or risk simulation as the author calls it). Chapters 3, 4 and 5 deal with various matters and complications concerned with probabilistic simulation. Most practitioners will find chapter 4 difficult to follow, but chapters 2, 3 and 5 are well written and extremely clear. Chapter 6 develops the decision tree approach to sequential investment decisions. Chapter 8 provides a useful Hertz type case study; chapter 9 is a novel and welcome addition dealing with the problems of introducing systematic risk evaluation and probability distributions into the organisational structure.

So far, this review has been less than complimentary, yet there is much of value in the book. By and large, it is a succinct, clear and well written book. Probabilistic simulation is adequately covered and the material developed in a novel and interesting way. The case study and organisational chapters (chapters 8 and 9 respectively) will be found especially useful by readers. The basic DCF techniques, decision trees and other tech-

niques for dealing with risk analysis are less satisfactory but at least do provide an overall grounding. A second edition, in my opinion, should expand its coverage of non-simulation techniques. Certainly chapter 1, which deals with basic DCF techniques, is too simplistic.

One of the strengths of the book is its appendices in which a series of FORTRAN programs and sub-programs are provided. In the world of the microprocessor (pity they were not written in BASIC), it is especially useful to have well documented software. An advantage of the book is the practical orientation of this complex subject. The author has, I suspect, tried the techniques out in the real world and brought the fruits of this applied research into the volume. However, an accounting practitioner may still find much of the book too theoretical; this of course does not detract from its academic merit.

I have two more minor criticisms. First, many of the references are obscure or old fashioned. Why, for example, was not *Computer Models for Accountants* by J. F. Flower (Haymarket, 1974) referenced? For a book providing 'practical procedures' the references are unnecessarily complex and not sufficiently central to be of value to readers of this journal. Second, and this is indeed a pity, the FORTRAN will almost certainly require modification. Long variable names are used and characters are stored in two byte (A8) formats. The FORMAT statements are of the old hollerith type and, unfortunately, the channel numbers have not been made variable. For the practical programmer, none of the above will represent an insurmountable problem and, although I have not personally tested the routines, the specification appears to be comprehensive and flexible.

Who will use the book? Despite the difficulties that might face the practitioner, I believe a few will be tempted into buying the book. It is a must for the library of medium to large practising offices. The structure and subject coverage of the book means that it will not be used by the majority of undergraduate courses, since the subject matter does not fit neatly into the usual undergraduate curriculum. Business schools and MBAs might have a greater need for the book as do academics teaching in the capital budgeting area. I will recommend the book as supplementary reading in some of the courses at my own university.

All in all this is a useful volume which could be much improved in a subsequent edition; I am confident that there will be a second edition and I

share the author's enthusiasm for risk appraisal. The commercial world will and must learn to adopt a more professional attitude to risk and probability theory.

University of East Anglia

K. N. Bhaskar

British Accountants. A Biographical Sourcebook.
R. H. Parker (ed.). Arno Press, 1980. \$25.

In this volume Professor Parker has tackled two important exercises: the compilation of a handy biographical dictionary of prominent British accountants and a prosopography of British accountancy leadership.

As a reference volume nothing presently available matches its inclusiveness. The sixty five biographies were selected with the inevitable element of subjectivity but also on the more objective assumption that professional leadership is minimally represented by major figures in dominant firms of accountants and by authors of practice-shaping textbooks. So Professor Parker's entries range from pioneers such as William Turquand, Frederick Whinney and David Chadwick, to dominant firm figures like the Cooper brothers, Deloitte, Plender and Thomson McLintock, and to influential authors such as Dicksee, Fells, Guthrie, de Paula and Pixley. In his selection of entries the editor is to be warmly complimented.

Much less satisfactory is the quality of the entries themselves, largely because of the nature of the sources. Nearly all the entries are published obituaries, two thirds of them taken from *The Accountant*. As such they display the strengths and weaknesses of the circumstances of their compilation. On the one hand colleagues might provide perceptive character sketches, bringing a personality to life and illuminating an understanding of the way in which the accountant worked. Good examples are Rowland's obituary of Dicksee who relied solely on intense concentration, rather than an examination of the existing literature, in writing his articles, or CEWM's recollection of Professor Laird, who (most progressively) enlivened his Edinburgh student classes in the 1920s by forming them into shareholders' meetings to which he posed awkward questions about hypothetical company accounts.

On the other hand the deficiencies of published obituaries are all too apparent. Under half the sixty five entries stated where the subject was born. Under a sixth provided the exact (day,

month, year) date of birth and, through the publisher's oversight, death dates have been omitted, along with a list of contents. Under a third identified the occupation of the subject's father. Under half gave details of the subject's education and under a quarter gave any indication of the subject's religious background. Naturally the obituaries are weighted towards the subjects' later careers so we learn relatively less about the ways in which they gained promotion within firms or by moving between firms. Above all, as the editor observes in his introduction, *de mortuis nil nisi bonum*.

In tracing the features of leading accountants as a group, Professor Parker is able to augment the obituary evidence from his own research. He observes several interesting characteristics: that a considerable number were of Scottish origin; that Quakers were in evidence; that accountants usually trained with consulting firms rather than at university; that official recognition in the form of a knighthood or peerage was rarely granted before the First World War; and that the biographies reflect the changing work of the public accountant from company liquidations and promotions in Victorian times to present day auditing.

What does not emerge from the collective biography or from the individual biographies is any clear view of the diffusion of new accounting techniques from professional consultancy firms into local government or into industry, as by the recruitment of trained accountants. Apart from de Paula (whose obituary gives little idea of his work at Dunlop), few of the obituaries indicate the kind of role played by accountants in improving Britain's bureaucratic or industrial efficiency. To start to understand this important question, we have to turn to Professor Parker's fine *Accounting Thought and Education: Six English Pioneers* (1980), written with Professor J. Kitchen. Until those authors extend their biographical essays further the volume presently reviewed stands in the gap.

Business History Unit,
London

David J. Jeremy

The Pricing Decision. Lawrence A. Gordon, Robert Cooper, Haim Falk & Danny Miller. National Association of Accountants and The Society of Management Accountants of Canada, 1981. ix + 52 pp.

This booklet emerges from the decision models research project sponsored jointly by The Society

of Management Accountants of Canada and The National Association of Accountants, New York. The aim was to find out how manufacturing firms in the US and Canada make their pricing decisions.

Studies of pricing decisions will always draw attention because prices are important to performance, because economics and managerial accounting have lavished analytical attention on price as a proxy for other variables, and because today most businessmen have had some exposure to price theory. The simple title of this booklet makes it even more arresting. Sadly, however, it is a disappointment. We know very little more at the end than at the beginning. We learn that different people are responsible for pricing policies in different firms, and pursue multiple objectives. Most consider both market conditions and costs in determining prices, and the majority think full costs are most relevant for pricing decisions although some think variable and full costs equally relevant. They also use historical cost, replacement cost, current market value or some combination.

The sense of disappointment, though, stems from more than just a confirmation that the business world does not divide into neat categories. It stems from the softness of the data used. The researchers ruled out a study of actual pricing decisions with their fundamental decision to carry out their study using administered questionnaires. Admittedly, these questionnaires were completed during interviews lasting one to four hours, but it is inevitably a study of subjective views and not of price decisions. Hard facts about actual pricing decisions are not the rock on which the study is based—despite its title.

This is not to say that the study has no value. The researchers have taken pains to write up the study in the style of an academic contribution and their statistics will certainly provide future researchers with a datum against which new research can be checked. Care will have to be taken, though. The questionnaire used is not reprinted and was, anyway, administered with discussion between the researchers and the interviewees. The findings on what costs firms use for price decisions provide a good example of the care needed in interpretation. The question asked of the 44 executives was 'Whether historical costs and/or replacement costs and/or current market values represented the *dominant method* for valuing product costs.' The italics have been added. The tabulation of results (Exhibit IV), however, is puzzling. Firstly, it leaves out 8 firms who appar-

ently 'indicated that costs did not play an *important role* in pricing their product line.' But this was not the question asked. Then even more strangely the remaining 36 firms are tabulated according to *use of cost method*:

- 5 *used* only historical cost
- 12 *used* only replacement cost
- 13 *used* only market value
- 6 *used* a combination of two or more.

Finally, the researchers conclude that the three cost methods 'were all *being considered* with an equal degree of frequency.' What really did they find—what was most used, what was important, what was considered or what was the most dominant method of valuation however little it was actually used?

One of the major claims of the authors is that their findings on the prevalence of multiple objectives differ from 'the literature which maintains that profit maximization is the single goal of firms' (p. 9). Where this large straw man resides in business literature is always a mystery but even if he is there, it is not at all clear that this study would actually knock him down. Firstly, the researchers differentiated pricing policies from pricing decisions: 'Pricing policies are the general principles which provide a guide or code for making pricing decisions. Pricing objectives are the goals that pricing policies are intended to accomplish' (p. 14). So the focus was again not on the actual pricing decision, which itself may be more hard-nosed. The executives, however, were invited to rank the importance of eight specified objectives on a 1 to 5 scale where 1 indicated that the objective did not play a role in pricing decisions (*sic*), and 5 indicated the objective was of prime importance. Average responses were as follows:

Total Profits	4.70
Return on Investment	4.41
Market Share	4.13
Total Sales	4.06

The other four objectives were less important, ranging in order from industrial relations (3.31) through employee job security, and liquidity down to price/earning ratio at 2.06. The authors then claim that 'since several objectives were found to be of key importance it would appear that the strategy employed was one of employing multiple objectives' (p. 15). This conclusion may not in fact follow, particularly if the executives were concerned with proxies for long run econ-

omic profit as an open-ended objective. In any case it takes a great leap of faith to believe that these 'objectives' actually determined their 'policies' which in turn determined their 'decisions', which were then taken other than to maximise long-run economic profit.

The major action recommendation of the study is its claim that management accountants should consider providing environmental data as a pricing input. Their recommendation apparently rests on nothing other than the fact that environmental data is already used in pricing. The managers interviewed indicated, for example, that forecasts of sales, consumer preferences and technology, and explicit tracking of competitors' actions had a very great influence on pricing decisions. Management accountants are probably best prepared to track competitor costs and their cost-volume-profit positions, but is it really within the accountant's competence to collect market information?

London Business School Kenneth Simmonds

Topics in Management Accounting. John Arnold, Bryan Carsberg & Robert Scapens (eds). Philip Allan Publishers Ltd, 1980. viii + 300 pp. £7.95.

The stated purpose of this book of readings is to bring the ideas of leading British academics in management accounting to undergraduate students. Why should students buy it? Let us look at some of the factors which might have a bearing on their decision.

Several considerations lend support to the idea of purchasing the book. It contains an impressive and varied range of authors; some are today's young Turks while others are already well established in the field. Students will find that most of the authors provide summaries of the existing state of knowledge in the specific areas that have been examined. For example, Ryan's chapter on 'Scientific Method' offers a brief yet comprehensive introduction to the subject. The chapter provides helpful coverage of a topic which is not usually discussed to any extent in introductory management accounting texts.

Another feature is that the book provides students with an opportunity to compare and contrast the writing styles of these leading academics. The elegance and lucidity contained in, say, Tomkins' chapter on 'Financial Planning and Control in Large Companies' is a fine example for perusal and imitation.

One further point is that the topics are

intended to complement introductory and intermediate texts in management accounting. Six main areas have been examined: conceptual foundations, forecasting, relevant costs for decision making, planning/control and information, historical development of management accounting and directions for future research. Undoubtedly, the topics do widen the agenda of some texts, such as Horngren's *Cost Accounting: A Managerial Emphasis*. On the other hand, there is some overlap with others, such as Amey and Egginton's *Management Accounting: A Conceptual Approach*. Nonetheless, many of the topics examined in Arnold *et al.* have a critical perspective which would be complementary to most introductory texts.

Finally, the editors have brought together contributions from diverse sources into a single volume. No one would wish to deny the convenience of such an arrangement, especially when the book is published in paperback at a price that students can afford. With library resources constrained, and numbers of accounting students high, student access to the latest ideas of accounting academics must be getting harder. A reader such as this would help to alleviate such problems, and for that the editors deserve credit.

Although the book has much to commend it, there are a few other aspects which prospective purchasers should bear in mind.

First, students will wish to know how representative the book is of British academic thinkers and thought. They cannot help but note that at least half of the fourteen contributions, including the first six chapters, have been presented by authors currently, or recently, associated with a single institution. This is not surprising because the three editors all work there. It is impossible to say whether a broader based editorial group would have published a different balance of views; perhaps few changes would have been made. However, it would be unwise for students to assume in an unquestioning fashion that, for example, the conceptual foundations outlined in the first four chapters, are acceptable to all or most British academics. This is important because they provide a framework for the remainder of the book. Furthermore, students are left in the dark about the quality of publications from British Polytechnics. Are there no leading academics in those institutions that might have been considered?

Second, readers are advised that the text contains 'original writings' by leading academics. There is ambiguity here which might confuse stu-

dents. Are the contributions original in an 'historical' sense? Or do they represent new ideas about each topic? In fact, no distinction has been drawn. Hence, as footnotes in the text explain, the chapters by Bromwich, Hopwood, Parker, Sizer and Amey & Egginton are all based upon ideas contained in articles or books published in the late sixties or early seventies. In consequence, only a few chapters contain new perspectives on current issues. Carsberg's discussion of the need for management accounting standards and Mace's view on the value of feedback are two examples which fall into this category of 'original' writings.

Third, students will be concerned to establish consistency in ideas from author to author. They will find that the opportunity cost concept and its importance in decision-making weaves a common thread throughout the book. Yet, how can students reconcile the statements that '... past costs are irrelevant for decisions' (Tomkins, p. 258) and '... a record of past activities of the business... is likely to be useful' (Carsberg, p. 11). Or the fact that Bromwich supports the 'residual income method' as it '... represents a step towards an evaluation system based on the same theoretical foundation as discounted cash flow models' (p. 216); whereas Tomkins states that residual income 'suffer(s) from inconsistency with the discounted cash flow methods of evaluating investment projects' (p. 258). Or, at the philosophical level, that Ryan, Cooper, Tomkins and Scapens all seem to say different things about research method. The latter observation merits detailed attention.

Ryan belittles the work of many academic accountants when he asserts that

Resort to the types of normative speculation and prescriptive methodologies advocated by

some accounting academics is an abrogation of the scientific commitment to understanding *real* accounting issues (p. 31).

In the next chapter Cooper proclaims that

... a major benefit of the SEU (subjective expected utility) model is its prescriptive element (p. 48).

Later, Tomkins confuses Ryan's views of normative and empirical (p. 241); Scapens states that quantitative techniques in management accounting have been characterised by normative reasoning (p. 281); and Carsberg thinks that the growth of these normative based techniques has been the most far-reaching development in the subject in recent years (p. 14). This is just a sample of some of the confusing comments that students have to reconcile.

Finally, it must be an onerous task for any editor to decide what to include in a book. Any reviewer is always at liberty to criticise part of the content as irrelevant. Likewise, a reviewer can be critical of obvious omissions. In this book the editors extend their apologies for such occurrences (p. vii, p. 14). The only comment to make here is that in spite of its acknowledged omission a chapter on capital budgeting is needed. Time after time the over-emphasis on short-run aspects of decision-making is criticised by the contributors. In addition, the need to integrate short and long run analysis is stressed, but in the event no integrating chapter materialises.

In summary, from *all* perspectives this book will convince the reader that much research still needs to be done in management accounting. Students should purchase it and study it thoroughly.

University of Sydney

R. L. Burritt

Contributors to Accounting and Business Research

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Announcements